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AIDS

TO

OBSTETRICS.

DOUBLE PART.

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PREFACE.

In writing the following pages, I have endeavoured to place before the student the leading facts of Obstetrics in as concise a form as possible. The object of these 'Aids,' as of others of this series, is to be a help in preparing for examinations. They are not intended to interfere, in any way, with the systematic reading on the subject.

I have to express my great indebtedness to the standard manuals of Playfair, Leishman, and Lusk, for the valuable aid I have received from them whilst preparing this compilation.

My thanks are also due to my friend Mr. A. Gresswell, B.A., Oxon, M.R.C.S. Eng., for kindly reading over the pages as they passed through the press, and for the correction of many literary inaccuracies.

S. N.

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AIDS TO OBSTETRICS.

I.—ANATOMY OF THE PELVIS.

The **Pelvis** is the bony basin situated between the spinal column above and the lower extremities below. Its antero-lateral walls are formed by the innominate bones, and the posterior wall by the sacrum and coccyx. It is divided into an upper and a lower part by the ilio-pectineal line; the part above the line is named the **False**, and the part below the line the **True** pelvis.

The **False Pelvis** is chiefly composed of the alæ of the iliac bones at the sides, and the base of the sacrum posteriorly; anteriorly the bony wall is deficient, the space being filled in by the abdominal wall.

The **True Pelvis.**—When speaking of the pelvis in obstetrics, it is the true pelvis that is generally referred to. **Its boundaries** are—the sacrum and coccyx posteriorly, the ischia and lower parts of the ilia at the sides, and the pubes anteriorly; the space between the sacrum and ischium is filled in on either side by the sacro-sciatic ligaments and the pyriformis muscle; the thyroid foramen is closed by the obturator membrane.

The **Pelvic Floor.**—Below, the pelvis is closed in by the following structures from within outwards: the peritoneum, the pelvic fascia, the levator ani and coccygeus muscles (on the same level), the sphincter ani, sphincter vaginæ and transversus perinei (on the same level), three layers of perineal fascia and skin. The floor is pierced in front by the urethra, behind by the rectum, and in the centre by the vagina. It serves to support the different organs found in the pelvis.

Contents of the Pelvis.—In addition to the internal generative organs (ovaries, uterus, etc.), various muscles—the pyriformis behind and the obturator internus anteriorly—the sacral nerves, the divisions of the iliac vessels, the rectum and bladder, help to fill up the pelvic space ; and they are occasionally subjected to dangerous pressure during labour.

The pelvis is essentially **a curved canal**, through which the fœtus passes in labour ; the posterior wall of the canal, formed by the sacrum, is curved, and is about 5 inches in length ; the anterior wall, formed by the pubes, is straight, and slopes slightly inwards below ; its length is about 1¾ inches. This canal presents for examination—an *inlet* or *brim*, an *outlet*, and a *cavity*.

The **Pelvic Brim or Inlet** is *bounded* by the ileo-pectineal line anteriorly and at the sides, and by the base of the sacrum posteriorly : it is of elliptical shape, the sacral promontory projecting slightly inwards behind.

Dimensions of the Brim :—**Antero-Posterior Diameter** or **Conjugate** : from the sacral promontory to the upper margin of the symphysis pubis measures 4¼ inches. **Transverse Diameter** : from the centres of ileo-pectineal lines of opposite sides measures 5¼ inches. **Oblique Diameter** : from one sacro-iliac synchondrosis to the pectineal eminence on opposite side measures 5 inches ; it is named *right* or *left*, according as it is measured from the right or left synchondrosis. The **Circumference of the Brim** measures about 16 inches.

Inclination of the Plane of the Brim to the Horizon is about 60°, the brim looking forwards and upwards.

The **Axis of the Brim** is a line perpendicular to the centre of the plane ; it passes through the umbilicus above, and the tip of the coccyx below.

The **Pelvic Outlet** is lozenge-shaped, and bounded from before backwards by the pubes, the pubic and ischial rami, the ischial tuberosities, the sciatic ligaments, and the coccyx.

Dimensions of the Outlet:—**Antero-Posterior Diameter**: from the lower margin of the symphysis to the tip of the coccyx measures 5 inches ; this measurement can be increased 1 inch by the tip of the coccyx moving backwards. **Transverse Diameter**: measured between the two ischial tuberosities is about 4½ inches.

Inclination of the Plane of the Outlet to the Horizon is about 11°, the outlet looking downwards, and very slightly backwards. The **axis of the outlet** strikes the sacral promontory above.

Dimensions of the Pelvic Cavity taken on a level with the lower margin of the second sacral vertebra :—**Antero-Posterior Diameter** measures 4¾ inches ; **Transverse**, 4¾ inches ; **Oblique**, 5¼ inches.

The **Axis of the Cavity** forms a curve running nearly parallel to the sacral curve, and joining the axis of the brim above and the axis of the outlet below. This curve is named the *circle of Carus* ; strictly speaking, it has more resemblance to a *hyperbolic curve* than to part of a circle.

Pelvic Articulations.—During pregnancy the ligaments and cartilages become relaxed and swollen from serous infiltration, and allow of a certain degree of movement in the various joints.

Movement in the Sacro-Iliac Joints.—During the first stage of labour the upper part of the sacrum rotates backwards and facilitates the entrance of the head into the brim ; as the head reaches the pelvic floor, the lower part rotates backwards, and thus increases the antero-posterior diameter of the outlet.

Movement in the Symphysis Pubis.—A slight amount of separation may take place in this joint during labour.

Movement in the Sacro-Coccygeal Joint.—Unless this joint is ankylosed, the tip of the coccyx can move backwards an inch, and thus increase the antero-posterior diameter of the outlet.

Inclined Planes of the Pelvis.—By the projection inwards of the ischiatic spines, two inclined planes are formed on each side, one behind the spines, sloping over the sciatic ligaments towards the sacrum ; the other in front of the spines, sloping over the body and ramus of the ischium towards the pubes. These planes take an important part in causing rotation of the head during labour.

Differences between the Female and Male Pelvis.—In the female the bones are lighter and smoother, the sacrum wider and more curved, the pelvic inclination greater, and the ischial tuberosities further apart. The brim is elliptical in the female, triangular in the male ; the sacral promontory does not project so much in the female. The thyroid foramen is triangular in the female, oval in the male. The pubic arch is wider (95° in the female, 80° the male) ; the iliac bones more spread out, and the hips further apart. The pelvic cavity is wider and shallower in the female.

II.—EXTERNAL ORGANS OF GENERATION.

The **Mons Veneris** is the cushion of fat covering the pubes ; the skin over it is covered with hair.

The **Labia Majora** are two integumentary folds extending backwards from the mons veneris, on either side the vulva. They consist of connective, elastic, and fatty tissues, covered externally by skin and a few hairs, and internally by mucous membrane. They contain an erectile venous plexus. In the young and healthy they are firm, but become flaccid in the old and feeble.

The **Clitoris** is a small elongated body seated behind the anterior junction of the labia majora. It closely resembles the penis in structure, having two corpora cavernosa and a glans, but differs from it in not being perforated by the urethra, and in having no corpus spongiosum. The clitoris is erectile and highly sensitive.

The **Labia Minora**, or **Nymphæ**, are two folds of mucous membrane lying internal to the labia majora. Anteriorly they join in front of the clitoris, forming the *Preputium Clitoridis.* Posteriorly they terminate behind the vaginal orifice in the *fourchette.* In the virgin they are small, and concealed by the labia majora ; but in the old and feeble they become lax and protrude beyond the labia majora, and may become cutaneous from exposure.

The **Urethra** is a very dilatable canal, about 1½ inches long. It can be felt through the anterior vaginal wall. It opens externally on a small papilla seated about ¾ inch behind the clitoris. The papilla serves as a guide for the passage of the catheter. (**Passage of the Female Catheter.**—The index finger of the left hand is placed between the nymphæ, and the papilla felt. The catheter is then passed along the finger, which guides it to the papilla.)

Glands of the Vulva.—There are numerous *sebaceous glands* about the labia majora and minora which secrete an odorous fatty matter. Several small *racemose mucous glands* are also found near the meatus. The **Glands of Bartholin (Vulvo-vaginal Glands)** are two small compound racemose glands seated on either side the vulva. The ducts open on the anterior margin of the hymen. They secrete a glairy fluid during coition and parturition.

The **Erectile Tissue of the Vulva** consists of two reticulated masses of erectile vessels lying on either side the vulva, and named the *bulbi vestibuli.* Anteriorly they join the erectile tissue of the clitoris by means of a small plexus, the *pars intermedia.* During labour, rupture of the vessels and extravasation of blood into the labia majora may occur.

The **Fourchette** is a thin fold of membrane lying behind the vaginal orifice. It is generally ruptured in the first labour.

The **Perineum** is the space lying between the posterior margin of the vaginal orifice and the anus. It is about 1½ inches in length, and is divided by a median raphé into two lateral halves. The triangular mass of connective tissue, lying between the lower part of the vagina and rectum above and the perineum below, is named **the Perineal Body.** These parts undergo great distension in labour, and by lengthening out they increase the length of the parturient canal by 3—4 inches, thus directing the axis of the canal forwards.

The **Vaginal Orifice** is bounded on either side by the labia minora. In the virgin it is partly closed by the *hymen.*

The **Hymen** consists of a fold of mucous membrane. It is usually of *crescentic shape*, the concave free edge being directed forwards. Other rarer conditions of the hymen are: (*a*) the *imperforate*, in which there is no opening; hence the vagina is closed, and retention of the menses results; (*b*) the *cribriform*, in which there are several small openings; (*c*) the *annular*, in which the hymen entirely surrounds the vaginal orifice, leaving only a small central opening.

The hymen generally ruptures during the first coitus, but it may occasionally persist after coitus, and in very rare cases after parturition.

The **Carunculæ Myrtiformes** are small elevations of the mucous membrane seated at the vaginal orifice. They are the remains of the ruptured hymen.

III.—THE INTERNAL GENERATIVE ORGANS.

The **Vagina** is a curved canal lying in the axis of the pelvis, and connecting the uterus with the external generative organs. Its anterior wall is shorter than the posterior, the former measuring 2½ inches, the latter 3½ inches in length. The two walls usually lie in contact. Anteriorly the vagina is closely attached to the base of the bladder, and to the urethra. Posteriorly it is attached to the rectum, except for about $\frac{1}{5}$ of its extent above, where the fold of peritoneum, called **Douglas's Pouch**, intervenes between it and the rectum. The vagina is most capacious above, where it encircles the cervix uteri, extending higher on its posterior than on its anterior aspect.

In structure the vagina consists of three coats: *mucous*, *muscular*, and an *external coat of connective tissue*. The *mucous coat* is covered by squamous epithelium, and possesses numerous papillæ and mucous glands. It is thrown into transverse rugæ, especially at the lower part of the anterior wall. The rugæ are best marked in the virgin, and become more or less effaced after child-bearing. The *muscular coat* consists of longitudinal and transverse fibres (unstriped) irregularly arranged. During pregnancy the muscular tissue increases in amount. Surrounding the lower part is a sphincter of voluntary (striped) muscular fibres

—the *sphincter vaginæ.* The *external coat* consists of connective tissue which serves to attach the vagina to the rectum and bladder, and to support the blood-vessels. Several erectile venous plexuses are found in the vaginal walls.

The **Uterus** is of pyriform shape. It is divided into a lower part, the *cervix*, and an upper part, the *body.* The **body of the uterus** is roughly triangular in shape, having the Fallopian tubes at its upper angles, and joining the cervix at its lower angle; the anterior surface is flat, the posterior convex; that part of the body above the junction of the Fallopian tubes is named the **fundus.** The *cavity of the body* is triangular, and communicates above on either side with the Fallopian tubes, and below through the *os internum* with the cavity of the cervix.

The **Cervix** is of fusiform shape, and has a spindle-shaped cavity communicating with the body above, and with the vagina below through the *os externum ;* the lower portion of the cervix projects into the vagina, forming the *portio vaginalis* of the cervix.

Differences between the Virgin Uterus and that of a Woman who has borne Children.

VIRGIN UTERUS.	UTERUS AFTER CHILD-BEARING.
2½ inches long.	3 inches long.
Cervix and body of equal length.	Body 2 inches long; cervix 1 inch long.
Sides of the cavity of the body are convex inwards.	Sides of the cavity of the body are convex outwards.
Os externum transverse, with smooth edges.	Os externum irregular, with fissured edges.

Structure of the Uterus.—The uterus has three coats: *mucous, muscular,* and *peritoneal.* The **mucous coat of the body** is lined by ciliated-columnar epithelium, and possesses tubular glands similarly lined; it is closely connected with the underlying muscular tissue. The movement of the cilia is directed upwards towards the Fallopian tubes. The **mucous**

coat of the cervix in its lower and outer part is covered with squamous epithelium; above, however, it is lined with ciliated epithelium. The mucous membrane of the cervix is thrown into penniform folds—the *arbor vitæ*. Numerous mucous glands are found in the cervix, and by blocking of their ducts may give rise to small vesicles—the *ovula Nabothi*. The **muscular coat** consists of three layers: an *outer longitudinal layer*, which sends fibres along the Fallopian tubes, the round and the broad ligaments; a *middle layer*, consisting of interwoven longitudinal and transverse fibres; in this layer lie the chief vessels of the uterus; an *internal layer*, consisting of circular fibres, which are most abundant at the orifices of the Fallopian tubes and os internum. The **peritoneal coat** covers the whole of the posterior surface and the upper three-quarters of the anterior surface; it is very closely attached, except at the sides where the vessels enter. Posteriorly the peritoneum passes down over the upper part of the vagina, and is then reflected on to the rectum, forming *Douglas's pouch;* anteriorly it is reflected on to the bladder, forming the *vesico-uterine fold;* laterally it is continuous with the *broad ligaments*.

The **Vessels of the Uterus** are derived from the ovarian and internal iliac arteries; they run a tortuous course through the broad ligaments, and form a capillary meshwork in the mucous membrane. From this meshwork the blood is taken up by small veins, which end in thin-walled sinuses lying in the middle muscular coat; from these sinuses the blood is carried off, chiefly to the ovarian veins, by the pampinniform plexus which lies in the broad ligament.

The **Lymphatics of the Uterus** commence in vessels or spaces in the different coats. Those from the body run to the lumbar glands; those from the cervix to the pelvic glands.

The **Nerves of the Uterus** are derived from the ovarian and hypogastric plexuses; they consist of cerebro-spinal and sympathetic fibres.

The **Position of the Uterus.**—Normally, it is slightly tilted forwards, and occupies the axis of the pelvic brim; it is, however, very movable, and its position is greatly modified by the degree of distension of the rectum and bladder.

Abnormalities of the Uterus.—The uterus may be *one-horned*, owing to the non-development of one Fallopian tube; or *it may be divided partly or completely by a median septum*, extending in some cases to the vagina, and thus giving rise to a *double uterus and vagina.*

Ligaments of the Uterus.—The *broad ligaments* are folds of peritoneum which pass off from the sides of the uterus to the iliac fossæ. They contain at their upper border the following structures from before backwards: the *round ligaments*, the *Fallopian tubes*, and the *ovary*. The **parovarium**, consisting of eight to sixteen small convoluted tubes, is also situated in the broad ligament. The broad ligament contains numerous muscular fibres, which may possibly serve to move the Fallopian tube and to contract the stretched peritoneum after parturition. The *round ligaments* run from the upper angle of the uterus through the inguinal canal, and end in the cellular tissue of the labia majora; they consist chiefly of unstriped muscular fibres.

In addition to the above ligaments, there are *two anterior* (utero-vesical) and *two posterior* (utero-sacral) *ligaments*, formed by the reflection of the peritoneum from the uterus on to the bladder and rectum.

The **Fallopian Tubes** open internally by a small orifice into the uterus at its upper angles; externally they have a much larger opening into the peritoneal cavity. The peritoneal orifice is surrounded by the *fimbriated processes*, one of which is longer than the rest and attached to the ovary. The tubes run a sinuous course, and are 3 to 4 inches long. In structure they consist of an external longitudinal and an internal circular layer of muscular fibres, and are lined by a folded mucous membrane; the mucous membrane is covered with ciliated epithelium, the cilia of which move towards the uterus.

The **Ovaries** are two flattened ovoid bodies, seated in the folds of the broad ligaments. They are connected with the upper angle of the uterus by a small band—*the ligament of the ovary*—and with the Fallopian tube by means of the long fimbriated process. During menstruation and pregnancy the ovaries enlarge; after the menopause they become atrophied. The surface of the ovary before puberty is smooth, afterwards it becomes puckered owing to cicatricial contraction of the *Corpora Lutea.* The ovaries are completely invested by peritoneum, except at the *hilum,* where the vessels enter.

Structure of the Ovary.—The ovary is chiefly made up of a *stroma,* consisting of connective tissue and unstriped muscular fibres. At the periphery the stroma is dense, and forms the *cortex;* at the centre it is loose and vascular, forming the *medulla.* The surface is covered with cubical epithelium, beneath which there is a very firm fibrous layer—*the Tunica Albuginea.* Scattered through the stroma are found numerous *Graffian follicles* in different stages of development. In the cortex these form a distinct layer.

Structure of a Graffian Follicle.—It consists of an *outer* and an *inner* coat. The outer coat has a fibro-vascular layer externally—the *Tunica fibrosa,* or *vasculosa*—and internally a layer of connective tissue corpuscles. The inner coat consists of several layers of columnar cells—the *Membrana granulosa.* To one part of the membrana granulosa the ovum is attached, and here the cells are heaped up around the ovum, forming the *Discus proligerus.* The rest of the cavity is filled up with the transparent *Liquor folliculi.*

The **Ovum** is a vesicle about $\frac{1}{180}$ inch in diameter. It is invested by a structureless hyaline covering—the *Vitelline membrane,* or *Zona pellucida.* Within this lies the *yolk,* a yellow granular viscid fluid. In the yolk is found the *Germinal vesicle,* a large clear refractive vesicle containing a small dark body—the *Germinal spot.*

Ovulation and Menstruation.

After puberty the ovary presents periodical elevations on its surface, due to the projection of mature Graffian follicles. About the time of a menstrual epoch a follicle bursts and discharges its contents, consisting of the ovum and some cells of the discus proligerus. The rupture of the follicle depends chiefly on the increased pressure of the fluid within it, but partly also on increased growth of the membrana granulosa, on hæmorrhage into the sac, and also on contraction of the ovarian stroma.

The **Corpus Luteum** is produced by the changes which occur in the Graffian follicle after expulsion of the ovum. The remains of the membrana granulosa proliferate and become folded, and, owing to a peculiar pigmentary degeneration, the cells assume a deep yellow colour. Pushing into the folds from without are seen vascular growths from the external capsule. The irregular cavity in the interior contains a little extravasated blood. The increase in size continues for some time, but in about two months contraction has occurred in the outer capsule, and transformed the corpus luteum into a white stellate cicatrix. If, however, pregnancy occur, the growth of the inner and outer parts of the Graffian follicle goes on for about four months, producing large fleshy folds. At this time the corpus luteum may measure one inch in length and half an inch in width, and form a projection on the surface of the ovary. After the fourth month gradual contraction of the external part begins, but the white stellate cicatrix is not formed till two months after parturition.

False corpus luteum is the term applied to the small growth which forms in the non-pregnant, the term **True corpus luteum** being used for the large growth arising in pregnancy.

Menstruation.—The *menstrual discharge* first commences about the fifteenth year, and recurs every four weeks, lasting generally about three or four days. The amount generally lost is about 2—3 ounces. In females resident in hot climates, or of enervating habits, the first onset is earlier, the flow lasts longer and is more profuse, and the intermenstrual periods are shorter than in those who reside in cold or temperate climates, or who are subject to hard physical work.

During pregnancy and lactation, menstruation and maturation of ova generally cease. Occasionally, however, ova may maturate and become impregnated when the menses are absent during lactation and from other causes; again in rare cases menstruation occurs during the first three months of pregnancy.

At the onset of the first menstruation (*puberty*) the breasts enlarge, hair appears on the pubes, and the pelvis gradually assumes the peculiar female shape. Between the ages of 40 and 50 the menses become more scanty and recur at longer intervals, and finally cease. This period of cessation is called the *menopause.* At this time various nervous disorders are liable to occur, and the ovaries and uterus undergo atrophy.

Characters of the Menstrual Discharge.—It consists of blood mixed with epithelium, mucus and *débris*; it has a faint heavy odour. **The Origin of the Discharge.**—It is derived from the uterine mucous membrane, which becomes congested and swollen and then breaks up, leaving the vessels beneath exposed. The changes in the mucous membrane are sympathetic with the maturation of a Graffian follicle, but whether impregnation of the ovum takes place before or after a menstrual epoch is not known.

Vicarious Menstruation.—This is a term applied to cases in which there is a periodical discharge of blood from some other organ, *e.g.*, stomach, nose, lungs, the normal uterine discharge being absent.

IV.—DEVELOPMENT OF THE OVUM AND ITS APPENDAGES.

Impregnation of the ovum probably takes place near the ovary or in the outer part of the Fallopian tube, the spermatozoa passing up the tube by their own vibratile movement though opposed by the ciliary current in the tube. When fertilized, the ovum is carried down to the uterus by the ciliary and peristaltic movements of the tube, and lodges in the uterus, where it undergoes development.

Changes in the Ovum after Impregnation.—The germinal vesicle and spot disappear, and the yolk undergoes segmentation (division), producing a layer of cells at the periphery of the yolk, beneath the vitelline membrane. This layer of cells is the *blastoderm*; it is from this that the embryo develops. The Blastoderm divides into three layers—an outer, *the epiblast*; an inner, *the hypoblast*; and a middle, *the mesoblast*; from these three strata all the tissues of the fœtus are formed; thus, *the epiblast* forms all epidermal structures, the brain and spinal cord, and organs of special sense; *the mesoblast*, muscles, bones, blood-vessels, and connective tissue; *the hypoblast*, the epithelial lining of the alimentary canal and its numerous glands.

The Umbilical Vesicle.—By a folding inwards of the lower part of the blastoderm the rudimentary alimentary canal is formed, which communicates with the yolk cavity by a constricted opening, *the umbilicus*; the yolk lying external to the umbilicus, and enclosed in a prolongation of the blastoderm, is termed the *umbilical vesicle*; it is from this that the embryo first derives its nourishment. Afterwards the umbilical vesicle undergoes atrophy, the embryo drawing its nourishment from the mother by means of the *placenta*.

The Chorion and Amnion.—The former is the outer, the latter the inner of the two membranes investing the fœtus. They are formed by folds which rise up on all sides of the embryo; the folds eventually meet above, and by blending enclose the embryo in a double-walled sac. The outer part of the fold, together with the vitelline membrane, becomes *the chorion*, whilst the inner part forms *the amnion*. They usually lie in close contact, but occasionally they are separated by a cavity containing fluid, which is discharged at birth and may be mistaken for *the liquor amnii*. Between the amnion and the fœtus lies a closed space, the *amniotic cavity*, containing *the liquor amnii*; in this fluid the fœtus is suspended. *In structure*, both membranes are fibrous and non-vascular. From the outer surface of the chorion arise non-vascular villi, into which run vascular off-shoots from the allantois.

The Allantois is a vascular growth from the posterior extremity of the intestine; it gradually grows out between the amnion and the chorion, and becoming closely applied to the inner surface of the latter, sends vascular loops into the chorionic villi; by the union of the allantois with the chorion **the Permanent Chorion** is formed. The allantois, like the chorion and amnion, at first completely surrounds the embryo; afterwards it undergoes atrophy, except at the part where the placenta is formed.

Whilst the above changes have been taking place in the ovum, the following changes have occurred in the *mucous membrane* of the uterus :—

Formation of the Decidua.—Before the arrival of the ovum in the uterus, the uterine mucous membrane has become hypertrophied and highly vascular, forming the *decidua.* When the ovum reaches the uterus, it generally becomes fixed on the posterior wall near the orifice of one of the Fallopian tubes, and the decidua gradually grows up and over it so as to completely invest it. That part of the decidua to which the ovum is attached is termed the **Decidua Serotina**; the part lining the rest of the uterus the **Decidua Vera**; and the part surrounding the ovum the **Decidua Reflexa.** Till the third month of pregnancy a space exists between the decidua vera and the decidua reflexa—the *hyperione*—from the lining of which menstrual blood may occasionally flow; after the third month they come in contact, lose their vessels, and undergo atrophy; at birth they are partly cast off with the fœtal membranes. After parturition the new mucous membrane is regenerated from some remnants of decidua and uterine glands left behind in the uterus.

Formation of the Placenta.—The vascular villi of the permanent chorion dip into pits formed in the decidua serotina and decidua reflexa. During the first two months this condition exists over the entire surface of the chorion, but afterwards the chorionic villi in contact with the decidua reflexa lose their vessels and become atrophied; the villi, however, in contact with the decidua serotina undergo great increase in size and vascularity, and form the *fœtal part* of the placenta. At the same time a similar increase in size and vascularity takes place in the decidua serotina, forming the *maternal part* of the placenta.

The **Placenta.**—When fully formed, the placenta is a spongy oval mass, measuring about 7 inches in its long diameter, and weighing about a pound. Its outer surface is granular and lobulated; its inner surface smooth and formed by the amnion. The placenta consists of the following parts, from without inwards: (*a*) *inner part of decidua serotina;* (*b*) *chorion;* (*c*) *allantois;* (*d*) *amnion.*

Vascular Arrangement of the Placenta.—Maternal Vessels.—In the decidua serotina are found spaces, into which blood is poured from the uterine arteries; from these spaces the blood is conveyed to the venous sinuses existing in the muscular coats of the uterus, and thence on to the veins outside the uterus.

Fœtal Vessels.—Vascular loops are found in the chorionic villi, through which blood is conveyed from the terminal divisions of the umbilical arteries to the commencing branches of the umbilical vein.

There is *no communication between the maternal and fœtal vascular systems;* the vascular chorionic villi simply dip into the blood contained in the spaces of the decidua. There are at least two layers of cells separating the maternal from the fœtal blood—one layer belonging to the villi, the other to the decidua.

Functions of the Placenta:—

Nutritive.—By its means the fœtus obtains nourishment from the mother.

Excretory.—It serves to transmit waste materials from the fœtus to the mother.

Respiratory.—The impure blood of the fœtus, by being exposed to the pure arterial blood of the mother, loses carbonic acid and takes up oxygen.

The different interchanges which take place in the placenta between the maternal and fœtal blood are dependent on the physical processes of *filtration* and *diffusion.*

The **Umbilical Cord** passes from the umbilicus to the centre of the under surface of the placenta. It is usually about 20 inches long, and of the thickness of the little finger. It is made up of the following structures: (*a*) *An outer sheath formed by the amnion,* which passes from the umbilicus along the cord to the under surface of the placenta. (*b*) *Two umbilical arteries and one umbilical vein.* (*c*) *The pedicle of the allantois.* (*d*) *The remains of the umbilical vesicle.* (*e*) *Wharton's jelly,* which is simply mucous connective tissue filling in the space between the other structures.

The umbilical vein has no valves, and the two umbilical arteries are twisted round the vein from *right to left.*

The **Liquor Amnii** ('*The Waters*') is the fluid distending the amniotic cavity. *In composition* it consists of water, a little urea and albumen, and salts. *Its functions are:* (*a*) To serve as a medium in which the fœtus floats. (*b*) To act as a fluid protective pad between the fœtus and uterine wall. (*c*) To form a dilating wedge, by means of which the cervix is dilated in labour. *Its origin.*—It is derived partly by exudation from the amnion and partly from the urinary secretion of the fœtus.

At birth the parts **expelled** are as follows:

(*a*) *The fœtus.*

(*b*) *The placenta,* consisting of decidua serotina, chorion, allantois, and amnion.

(*c*) *The cord,* consisting of amnion, Wharton's jelly, two umbilical arteries and one vein, remains of umbilical vesicle and pedicle of allantois.

(*d*) *The membranes* formed by the chorion and amnion.

(*e*) *The liquor amnii.*

V.—ANATOMY AND PHYSIOLOGY OF THE FŒTUS.

Chief Characters of the Fœtus at Different Stages of Development.

At the **First Month** the embryo measures about a line in length. The umbilical vesicle and amnion are formed.

At the **Second Month** the rudiments of the head, limbs, vertebræ, heart, and permanent kidneys appear. The umbilical cord is distinct. Ossification of the clavicle and lower jaw begins. The length is a little under an inch.

At the **Third Month** the umbilical vesicle undergoes atrophy. The placenta is formed. The decidua reflexa and decidua vera come in contact. The anus and mouth are closed. The extremities are separable into three parts. The fingers and toes appear. The length is about 2½ inches.

At the **Fourth Month** the sex is distinguishable. The anus and mouth open. The convolutions of the brain commence to develop. The muscles are formed. Ossification begins in the frontal and occipital bones. The length is about 5½ inches, and weight 5 ounces.

At the **Fifth Month** the hair and nails form. Ossification commences in the ischium. The length is about 10 inches; the weight 10 ounces.

At the **Sixth Month** the eyelids are formed, but adherent. The membrana pupillaris is present. The testes lie near the kidney. Length, about 12 inches; weight, about 1 pound.

At the **Seventh Month** the eyelids are open, but the membrana pupillaris still exists. The testes are descending. The skin is covered with the **vernix caseosa.** The length is about 14 inches; weight, about 3½ pounds.

At the **Eighth Month** the membrana pupillaris is gone. The testes are in the inguinal canal. Length, about 16 to 18 inches; weight, about 4½ pounds.

At the **Ninth Month** the testes have reached the scrotum. Length, about 18 to 20 inches; weight, about 6 to 8 pounds. The male fœtus is a little longer and heavier than the female.

By the above characters it is possible to determine approximately the age of the fœtus in cases of abortion and miscarriage.

The Head of the Fœtus at Full Term.

Sutures of the cranium are membranous spaces separating the contiguous borders of bones; they are as follows: the **frontal,** separating the two halves of the frontal bone; the **coronal,** separating the frontal from the parietal bones; the **sagittal,** between the two parietal bones; the **lambdoidal,** separating the occipital from the parietal bones.

The **Fontanelles** are membranous spaces separating the contiguous angles of bones; the two chief are: the **anterior** (sometimes called the **bregma**), which is lozenge-shaped, and lies at the junction of the frontal, coronal, and sagittal sutures; the **posterior,** smaller than the anterior, and triangular in shape, lying at the junction of the sagittal and lambdoidal sutures.

Moulding of the Fœtal Head.—Owing to the presence of the sutures and fontanelles, and also to the flexibility of the cranial bones, the head can undergo considerable change in shape during its passage through the pelvis in labour.

The **Changes in the Position of the sutures and fontanelles** serve to indicate the changes in position which the fœtal head undergoes during its passage through the pelvis.

Measurements of the Fœtal Head.

Occipito-mental diameter, from occiput to chin, 5¼ inches.

Occipito-frontal diameter, from occiput to root of nose, 5 inches.

Sub-occipito-bregmatic diameter, from a point midway between the occipital protuberance and the foramen magnum to the anterior fontanelle, 3¾ inches.

Bi-parietal diameter, the distance between the two parietal protuberances, 3¾ inches.

Bi-temporal diameter, the distance between the two extremities of the coronal suture, 3¼ inches.

Fronto-mental diameter, from summit of the forehead to the chin, 3¼ inches.

The measurements are a little greater in the male than in the female.

The **movements of the fœtal head on the spinal column** are of wider range than in the adult; thus the fœtal head can be rotated without danger through a quarter of a circle.

Nutrition of the Fœtus.—The early embryo is nourished *partly by the yolk* and *partly by absorption through the chorionic villi;* after the third month the *placenta* is the medium through which it is nourished.

The **Fœtal Circulation.**—**Peculiarities.**—There is a direct communication between the right and left auricles by means of the **Foramen ovale**; passing from the pulmonary artery to the aorta is a communicating vessel, the **Ductus arteriosus**, which joins the aorta at a point just beyond where the vessels to the head and upper extremities are given off; lastly, there is a direct channel of communication between the umbilical vein and the inferior vena cava by means of the **Ductus venosus.**

Course of the Circulation.—Pure blood is brought back from the placenta by the *umbilical vein,* and is then passed by the *ductus venosus* along the under surface of the liver to the *inferior vena cava,* thus reaching the *right auricle* with the impure blood from the abdomen and lower extremities.

From the right auricle it is guided by the *Eustachian valve* through the *foramen ovale* into the *left auricle,* and thus into the *left ventricle ;* it is then carried by the *aorta* to the *vessels of the head, neck, and upper extremities.* The impure blood from these parts is borne by the *superior vena cava* into the *right auricle,* and thence to the *right ventricle,* which transmits it to the *pulmonary artery ;* the greater part of this impure blood then passes over to the *aorta* by means of the *ductus arteriosus,* and is carried away by the aorta, chiefly to the *umbilical arteries.* The blood thus reaches the *placenta,* where it is purified and commences the cycle afresh.

Shortly after birth, owing to the commencing activity of the lungs and to the loss of the placental circulation, closure of the umbilical arteries and vein, and closure of the ductus arteriosus and ductus venosus occur. The foramen ovale also becomes partly or wholly closed.

VI.—CHANGES IN THE MOTHER CONSEQUENT ON PREGNANCY.

Changes in the Size and Weight of the Uterus.—The *muscular, vascular,* and *nervous tissues* of the uterus undergo *hypertrophy ;* hence the uterine walls increase greatly in thickness. This increased growth is chiefly confined to the body of the uterus, and is most marked at the placental site. The peritoneal coat of the uterus also becomes stretched and thickened. At the end of pregnancy the uterus measures about 12 inches in length, and weighs about 1½ pounds.

Changes in the Position of the Uterus.—During the first three months it remains in the pelvis and *sinks* a little ; after that time it rises above the pelvic-brim, and its size gives us a rough estimate of the stage of pregnancy: thus, at the end of the fourth month it rises about 2 inches above the pubes; at the seventh month it reaches to the umbilicus, and at the ninth to the ensiform cartilage. Whilst in the pelvis the uterus is often *bent forward* (*ante-flexed*); when above the brim its long axis corresponds with the axis of the brim. The pregnant uterus is often *bent slightly to the right* (*latero-flexed*), owing, partly to the presence of the rectum on the left side, and partly to the shortness of the right round ligament.

Changes in the Shape of the Uterus.—During the *first three months* it is *pyriform* in shape. From the *third to the sixth month* its shape is that of a *flattened spheroid—i.e.*, it is broader than it is long. After the *sixth month* an *increase* takes place in its *longitudinal diameter*, so that its *length becomes greater* than its *width.*

Changes in the Cervix Uteri.—A *slight hypertrophy* of the tissues of the cervix takes place. Owing to serous infiltration the cervix becomes *softened*, and the os externum *will admit the tip of the finger* (*patulous*). No real shortening of the cervix occurs during pregnancy, the apparent shortening which is felt being due to the softening; a few days, however, before labour, real shortening may take place, as incipient uterine contractions may slightly open up the cervical canal.

Changes in the Vagina.—The mucous and muscular coats undergo hypertrophy, and there is increased vascularity and secretion. Owing to venous congestion, the mucous membrane assumes a peculiar purple tint.

Changes in the Abdominal Walls.—During the first three months, owing to the sinking of the uterus, the abdominal walls become slightly flattened, and the umbilicus depressed; after that time the walls become more and more prominent with the gradual increase in size of the uterus, and the depression of the umbilicus gradually disappears, till finally, during the last two months of pregnancy, it projects beyond the surrounding surface. White or bluish streaks—**lineæ albicantes**—form on the lower part of the abdomen, on the buttocks, and on the outer part of the thighs; they are due to stretching and partial atrophy of the skin. Owing to the pressure of the uterus, the recti muscles may separate.

Pressure on the Pelvic Contents.—Occasionally irritation of the bladder, constipation, cramps in the legs, œdema, and varicose veins of the legs and vulva may occur from pressure of the enlarged uterus on the bladder, rectum, sacral plexus, and iliac veins respectively.

Changes in the Blood and Circulatory System.—The blood becomes *hydræmic* and *anæmic*, containing more white corpuscles, fibrin and water, and less red corpuscles, albumen, and salts, than normal. Owing to the increased amount of work thrown on the heart, *hypertrophy* and *dilatation of the left ventricle* occur. There is *increased arterial tension.*

Changes in the Respiratory System.—An *increased amount of carbonic acid* is given off from the lungs. *Pressure of the enlarged uterus* on the diaphragm may occasionally embarrass respiration.

Changes in the Skin.—Brown pigmentation about the forehead, face, linea alba, umbilicus, and external genital organs is very common. A dark circle around the eyes is of frequent occurrence in early pregnancy.

Changes in the Urinary System.—Owing to increased arterial tension, there is a larger amount of urine secreted than normal, and a trace of albumen is very common. On standing, the urine of pregnancy presents a pellicle on the surface, which after a time sinks to the bottom of the vessel and forms a deposit consisting of fat, crystals of triple phosphate, and bacteria. It was formerly thought that this pellicle and deposit (**kiestine**) were peculiar to the urine of pregnancy; but it is now known that they may arise in other conditions accompanied with anæmia and occasionally they are present in the urine of health.

Changes in the Digestive System.—The appetite is often capricious or depraved. Nausea and vomiting (probably reflex) are very common, especially in the morning. They generally disappear after the third month. Profuse salivation occasionally occurs.

Changes in the Nervous System.—Various functional disturbances may occur in the nervous system, and are probably of reflex origin—*e.g.*, neuralgia of different nerves, local paralysis, anæsthesia of various nerves, attacks of fainting, blindness or deafness, fretfulness, depression of spirits, etc.

Changes in the Osseous System.—Osteophytes, which are thin plates of lime-salts, are occasionally deposited on the inner surface of the cranial bones.

Changes in the Weight of the Body.—During the first three months of pregnancy there is a loss of weight, but after that time the body gradually gains in weight, independently of the uterus and its contents.

Changes in the Mammary Glands.—They increase in size, owing to the rapid growth of the *glandular*, *fatty*, and *connective* tissues of the glands. Distended superficial veins and lineæ albicantes (due to stretching of the skin) are seen on the surface. The gland is often tender to the touch, and, owing to the enlarged glandular acini, has a knotty feel at the periphery.

The **Nipple** and its sebaceous follicles increase in size, and after the third month a **dark pigmented areola** forms around the nipple. External to the areola a lighter pigmented area is often seen—the **secondary areola.** The areolæ are most marked in dark women. After the third month milk can be expressed from the nipple.

VII.—SIGNS AND DIAGNOSIS OF PREGNANCY.

The signs of pregnancy have been classified according to their diagnostic value into *presumptive*, *probable*, and *certain.*

Signs of Pregnancy.

(*a*) **Cessation of Menstruation** suggests the existence of pregnancy in cases where the menses have previously been regular. It is of no use as a sign in cases where pregnancy commences during lactation, or before the first onset of menstruation. Its value is also lessened, as other causes, such as cold, disease, etc., may produce stoppage, and because pregnant women occasionally menstruate during the first three months of pregnancy.

(*b*) **Mammary changes.**—The enlargement of the breasts, the distended superficial veins, the secretion of milk, and the dark areolæ are valuable signs, especially if occurring in a primipara. Occasionally the dark areola may be absent in the pregnant, and milk may in rare cases be present in the breasts of the non-pregnant.

(*c*) **Quickening.**—This is the sensation produced by the movements of the fœtus. The movements are first felt about the sixteenth week, and at first are feeble and fluttering in character; as pregnancy advances they increase in intensity and become much more perceptible. and may be felt as distinct kicks. Pressure on the uterus, abstinence from food, and any condition threatening the life of the fœtus cause an increase of the movements. Occasionally the movements cease for days or weeks at a time, and in some cases they may be entirely absent.

If the movements of the child are *felt and seen by the physician they constitute a very valuable sign;* if only perceived by the mother, the sign is of much less value, as she may be deceived by the sensation caused by flatus, or irregular contractions of the abdominal muscles.

(*d*) **Intermittent Contraction and Hardening of the Uterus.**—Perceptible by the hand placed on the abdomen; this is a fairly reliable sign, though it is occasionally present in cases of fibroids of the uterus.

(*e*) **Sympathetic Nausea and Vomiting,** occurring in the morning, often lead to the suspicion of pregnancy.

(*f*) Vaginal Signs.

i. **Changes in the Cervix Uteri.**—The soft velvety condition, occurring after the third month, is a sign of great value.

ii. **The purple tint of the mucous membrane of the vagina** is a valuable sign.

iii. **Ballottement.**—This is the sensation produced by the fœtus falling back on to the tips of the examining finger after a sudden push has been applied to it by the finger placed in front of the cervix uteri. This sensation can only be produced by a body freely moveable in the uterus, hence it is a sign of much importance.

(*g*) **Auscultatory Signs.**

i. **Fœtal Heart-Sounds.**—They are *first heard* during the *fourth* or *fifth month.* *Their frequency* is about 120 to 160 beats per minute, the number of beats depending on the size of the child; thus, it is greater in small than in large fœtuses, hence the greater frequency in female children. Movements of the mother or the fœtus increase the number of beats. At the commencement of a pain the frequency is increased, but diminished at the height of a pain, owing to the interruption of the placental circulation. *Characters of the Sounds.*—There is a double beat like that of a watch. The sounds are often obscure or absent if the abdominal walls are thick, or the liquor amnii excessive in amount, or if the back of the child is turned towards the back of the mother. *Position where best heard.*—The sounds are best transmitted through the back of the fœtus, hence in most cases, as the back of the fœtus is turned towards the mother's left, they are best heard on the left side of the abdomen half way between the umbilicus and the anterior superior iliac spine. In breech presentations they are most audible above the umbilicus, and to the left or right, according to the position of the back of the fœtus. *Tumultuous irregular beating* of the heart often signifies approaching death of the fœtus, and absence of the sounds for a long time after they have been previously heard, is diagnostic of its death. If the fœtal heart-sounds are heard, the diagnosis of pregnancy is certain.

ii. **The Uterine Souffle.**—This is a single blowing or whizzing murmur heard synchronously with the mother's pulse; it is best heard low down at the sides of the uterus, and is probably produced in the uterine arteries. It is of little value as a sign of pregnancy, because it is often present when the uterus is enlarged by fibroids.

iii. **The Umbilical Souffle** is a single hissing sound synchronous with the fœtal heart sounds; it is probably produced by the blood flowing along the umbilical arteries.

(*h*) **Increased size of the abdomen** often leads to the suspicion of pregnancy, but the enlargement may be due to ovarian or fibroid disease, ascites, tumours of the abdominal viscera, etc.; these conditions must therefore be excluded before this sign can be of any value.

i. **Diagnosis of Pregnancy from Ovarian and Fibroid Tumours.**—The presence of the chief signs of pregnancy (the mammary, menstrual, auscultatory, ballottement signs, etc.) in a case of pregnancy, and the absence of these signs in ovarian and fibroid disease, associated in the case of ovarian disease with the presence of a smooth fluctuating tumour, and in the case of fibroid disease with a tumour having a hard and often nodular surface, would readily decide the diagnosis. Occasionally pregnancy complicates a case of ovarian or fibroid tumour, and the diagnosis of pregnancy then becomes difficult; in such cases the abdominal tumour will often be found to be of unsymmetrical shape—a distinct depression may be found between the tumour and the uterus. The detection of the softened cervix and of the fœtal heart-sounds will clear up the diagnosis.

ii. **Diagnosis of Pregnancy from Ascites.**—The absence of all the important signs of pregnancy and of any defined uterine tumour, and the presence of free fluctuation, will serve to distinguish ascites from pregnancy.

iii. **Phantom Tumours and Spurious Pregnancy.**—These conditions generally arise in hysterical women, and depend on the presence of flatus and irregular contraction of the abdominal muscles. They are occasionally accompanied by cessation of the menses and movements simulating quickening, and may thus puzzle the physician; such cases are, however, readily distinguished from pregnancy, as the fœtal heart-sounds are absent and the cervix uteri is unchanged, and if chloroform be given the tumour disappears.

iv. **Tympanites, obesity, abdominal enlargement due to hydatids and other tumours,** are readily distinguished from pregnancy, as all the important signs of the latter condition are absent.

VIII.—DURATION OF PREGNANCY.

The exact duration of pregnancy is not known, as it is impossible to fix the precise date of conception. From calculations, based partly on statistics regarding the period of time which elapses between the cessation of menstruation and the onset of labour, and partly on cases in which the effect of a single coitus is known, the duration is found not to be a fixed one, but to vary within certain limits. The average duration obtained in this way is about 278 days.

Prediction of the Day of Confinement.

All methods for calculating the date of confinement take the last menstrual period as their starting-point. Owing to the uncertainty as to when conception takes place, an error of a few days is almost inevitable.

The **Method employed by Dr. Matthews Duncan** consists in taking 278 days from the day on which the last menses ceased, and is as follows :—' Find the day on which the female ceased to menstruate, or the first day of being what she calls "well." Take that day nine months forward as 275, unless February is included, in which case it is taken as 273 days. To this add three days in the former case, or five if February is in the count, to make up the 278. This 278th day should then be fixed on as the middle of the week, or, to make the prediction more accurate, of the fortnight in which confinement is likely to occur, by which means allowance is made for the average variation of either excess or deficiency.'

Naegele's Method.—Take the date on which the last menses first appeared, and add seven days to it. From the date thus obtained reckon back three months. This will give the probable time of confinement.

An approximate calculation of the probable stage of pregnancy and date of labour can be obtained by noting the time when quickening first occurs (it generally begins during the first fortnight of the fourth month), and also by measuring the height of the uterus above the pubes. These methods are of use when pregnancy commences during the absence of menstruation, *e.g.*, during lactation.

IX.—GENERAL MANAGEMENT OF PREGNANCY.

As the pulmonary excretion of carbonic acid is increased during pregnancy, a free supply of fresh air is necessary. Tight stays should be discarded and a loose dress worn, so as not to impede the respiratory movements. Gentle exercise in the open air should be taken, but violent exercise avoided, lest miscarriage be produced.

The diet should be plain, nutritious, and easily digestible.

If the abdominal walls are lax, a well-fitting abdominal belt is often of service.

X.—DISORDERS OF PREGNANCY.

The disorders of pregnancy depend generally on one or more of the following conditions:—

(*a*) *Reflex derangements of the nervous system or of the digestive organs.*

(*b*) *The hydræmic and anæmic state of the blood.*

(*c*) *The increased amount of work performed by the lungs and kidneys.*

(*d*) *Pressure of the uterus on neighbouring organs.*

Disorders of the Digestive System.

Nausea and vomiting are very common. There may be only a little morning sickness, which terminates about the time of quickening. In other cases it is more troublesome, and in the worst cases everything is rejected, and the patient may die with all the symptoms of starvation. Occasionally abortion occurs, and then the symptoms cease. **Treatment.**—Regulation of the bowels, easily digestible food in small quantities and at short intervals, iced-milk and soda-water generally suffice *in the mild cases. In the more obstinate cases* one of the following drugs may prove of service : Oxalate of cerium in three grain doses, nitrate of bismuth, hydrocyanic acid, creasote, arsenic, hypodermic injections of morphia ; ice should be given to suck, and an ice-bag applied to the back of the neck. If the stomach will retain no food, nutrient enemata must be given. If the vomiting be kept up by congestion of the cervix, a few leeches should be applied to the cervix ; if the uterus is displaced, the displacement should be remedied by a pessary. In rare cases, when all treatment proves of no avail and the patient's life is in danger, induction of abortion may be necessary.

Diarrhœa may occur, and if severe may lead to abortion. **Treatment.**—The diet should be regulated, and P. Cretæ. Aromat. c̄ Opio, or other ordinary remedies given.

Constipation is very common, and depends partly on the pressure of the uterus on the rectum, and partly also on atony of the intestine. **Treatment.**—A laxative diet (oatmeal, fruits, etc.) should be ordered, and a mild laxative given occasionally, such as compound rhubarb pill or a little laxative mineral water. When the bowels are much overloaded, Enema Saponis is the best remedy.

Dyspepsia with anorexia and flatulence. **Treatment.**—The diet should be regulated. Alkalies, or the dilute nitro-hydrochloric acid may be of service.

Piles depend upon the pressure of the uterus on the rectum. **Treatment.**—Unguent. Gallæ c̄ Opio should be applied locally, and a little confection of senna taken in the morning before breakfast.

Salivation.—Occasionally very profuse salivation takes place. **Treatment.**—Quinine and opium, or small doses of Atropia or Pilocarpine may be tried.

Disorders of the Blood and Circulatory System.

Anæmia and Hydræmia.—Reference has been made to these two conditions of the blood in a previous section; both are normally present during pregnancy. If, however, they are excessive, their presence becomes pathological. The **Anæmia** is best treated with preparations of iron and a liberal diet. Occasionally the anæmia passes into the **pernicious form of the disease**, and may prove fatal. The **Hydræmia**, if excessive, gives rise to œdema of the legs and vulva, which may extend to the upper part of the body and to the face. The œdema thus arising must be distinguished from that due to Bright's disease or to pressure of the uterus on the abdominal veins. **Treatment.**—The same as in anæmia. The œdema may be lessened by the exhibition of diuretics (acetate of potash, digitalis), and by diaphoresis (Turkish baths, etc.); and if excessive in any part, the part may be punctured with a small trochar.

Palpitation and Attacks of Fainting are not uncommon during pregnancy, and generally depend on the anæmic condition of the blood. Occasionally, however, they may be due to the pressure of the enlarged uterus on the diaphragm. **Treatment.**—During the attacks, the patient should be laid on her back, and an ether draught or brandy given. Between the attacks the anæmia should be treated by preparation of iron, etc.

Varicose Veins of the legs and vulva are very common, and depend on *pressure of the uterus* on the abdominal veins. **Treatment.**—The patient should avoid standing and walking as much as possible, and should wear a bandage or elastic stocking on the limb affected ; if rupture of the vein occurs, the hæmorrhage should be controlled by application of a lint compress, or of lint soaked in a solution of perchloride of iron.

Disorders of the Genito-Urinary System.

Albuminuria is of common occurrence in pregnant women. In most cases it is temporary, and depends either on *pressure* of the uterus *on the renal veins*, or *on hydræmia ;* in other cases it is of a *more serious* nature, and is due to *renal disease* (*Bright's disease*). **Symptoms.**—If due to Bright's disease, there is general œdema, headache, vomiting ; *the urine* is scanty and contains blood, casts, and albumen ; attacks of convulsions (eclampsia) may occur, and the patient may abort. **Treatment.**—Preparations of iron should be given internally ; *diuresis* (by acetate of potash and digitalis), *purging* (by P. jalap. comp.), and *diaphoresis* (by baths), should be induced in order to lessen the œdema.

Retention of Urine may occur ; it is generally due to the uterus being displaced and pressing on the neck of the bladder. **Treatment.**—The urine should be drawn off with the catheter and the uterus replaced.

Incontinence of Urine is common, and is often produced by pressure of an *anteverted* uterus on the fundus of the bladder. **Treatment.**—The uterus should be raised and supported by an abdominal belt.

Leucorrhœa, depending on congestion of the mucous membrane of the vagina, is very common ; it disappears after labour. **Treatment.**—Cleanliness, and the occasional *cautious* use of an injection of diluted Condy's fluid.

Pruritus Vulvæ is frequent, and may be very distressing. It is either entirely nervous in origin, or dependent on an irritating vaginal discharge. **Treatment.**—If of *nervous origin,* bromide of potassium internally is often of service ; when *secondary to an irritating discharge,* cleanliness and the local application of some sedative lotion, such as lead lotion, or lotio acid. carbolici, generally give relief.

Disorders of the Nervous System.

Sleeplessness may be troublesome. *It is best treated* by gentle out-door exercise, bromide of potassium, or chloral; opium should be avoided.

Paralysis of various Nerves occasionally occurs, *e.g.*, facial paralysis, hemiplegia, paraplegia, etc. These cases are generally dependent on hysteria or Bright's disease; some cases of paraplegia depend on the pressure of the uterus on the branches of the sacral and lumbar plexuses of nerves. **Treatment.**—When the paralysis is due to Bright's disease it is of grave import, as it is really a symptom of uræmic poisoning; in such cases abortion should be induced; when not associated with albuminuria the pregnancy may be allowed to go on to full term, as recovery will probably take place after delivery.

Neuralgia of various nerves is very common, *e.g.*, facial, intercostal, mammary, etc. **Treatment.**—Quinine or chloride of ammonium should be given internally, and belladonna liniment or iodine liniment applied locally. In very severe cases a hypodermic injection of morphia gives relief.

Chorea not uncommonly appears in pregnancy for the first time, or pregnancy may bring on a second attack in a female who has had chorea previously. It often recurs in successive pregnancies. Chorea occasionally brings on abortion, and recovery then takes place, or it may prove fatal by exhausting the patient; hence it is a serious complication both for the mother and child. **Treatment.**—Some preparation of iron along with arsenic or bromide of potassium should be given internally; in the severe forms, induction of abortion may be necessary to save the mother's life.

Insanity of Pregnancy and **Eclampsia** occurring during pregnancy are treated of under their special sections.

Disorders of Respiratory System.

Nervous Spasmodic Cough occasionally occurs, and is probably of reflex origin. **Treatment.**—Belladonna and bromide of potassium internally.

Dyspnœa is frequent, and in the latter months it depends on pressure of the uterus on the diaphragm; in the earlier months it is probably reflex.

Displacements of the Gravid Uterus.

Anteversion.—The non-pregnant uterus is slightly tilted forwards (*anteverted*). During the early months of pregnancy this normal anteversion is increased; the uterus, however, easily rises out of the pelvis. Occasionally in the later months the anteversion may be very great, and by the yielding of the abdominal walls and separation of the recti muscles '*pendulous abdomen*' is produced. **Treatment.**—Dorsal decubitus and the use of an abdominal belt.

Prolapse of the gravid uterus is rare; it is due to pregnancy occurring in a prolapsed uterus. The uterus usually rises out of the pelvis about the fourth month; in some cases, however, it does not rise, and may become incarcerated in the pelvis, and, by pressing on the rectum and bladder, produce rectal and vesical troubles. If it remain in the pelvis, abortion often occurs, as it is impossible for pregnancy to go on to full term. **Treatment.**—Replace the uterus, and maintain it in position till the sixth month by rest in bed and a pessary. If the uterus cannot be replaced, induction of abortion will be necessary.

Retroversion occasionally occurs suddenly in the pregnant uterus as the result of a fall or blow; generally, however, it depends on pregnancy occurring in a retroverted uterus. **Symptoms.**—As the cervix is directed forwards, it presses on the bladder and causes retention of urine and distention of the bladder, or incontinence of urine; the fundus is directed backwards, and by pressing on the rectum causes constipation and rectal tenesmus. **Signs.**—The absence of uterine tumour above the pubes, and the presence of the fluctuating distended bladder, can be made out; a rounded swelling (the fundus) is felt in Douglas's pouch, and the cervix is high up behind the pubes. **Termination.**—It may rise out of the pelvis at the fourth month, and pregnancy go on normally; or incarceration of the uterus beneath the sacral promontory may occur, terminating either in abortion, or in death from rupture or sloughing of the bladder, or from retention of urine and uræmia. **Treatment.**—The urine should be drawn off by the catheter if possible; but if the catheter cannot be passed, the bladder should be punctured above the pubes, and the urine drawn off by the aspirator. The uterus should then be replaced by pressure applied to the fundus by means of the fingers in the vagina or rectum, or by pressure of caoutchouc-bags (distended with water) in the vagina; the pressure should be applied upwards and slightly to one side, so as to avoid the sacral promontory. After replacement, a pessary should be used to keep the uterus in position. If replacement is impossible, and pressure symptoms arise, abortion should be induced, either by passing the uterine sound, or, if the *os externum* cannot be reached, by puncturing the membranes with the aspirator through the posterior wall of the cervix.

Relaxation of the Various Pelvic Joints may occur to an abnormal extent, and give rise to difficulty in locomotion and rheumatic pains. **Treatment.**—The application of a good binder will be of service.

The following diseases, when complicating pregnancy, may influence its course; and in many cases the ordinary course of the disease is influenced by the pregnancy:—

The **Exanthemata.**—**Small-Pox** is a very grave complication of pregnancy, especially if *confluent.* The life of the mother and child are often endangered, owing to the liability to uterine hæmorrhage and abortion. The fœtus often contracts the disease. **Measles** and **Scarlet Fever**, if mild, have no influence on pregnancy; but, if severe, they are liable to cause abortion.

Syphilis may be contracted by the mother directly from the father, or indirectly through the ovum. It is a very frequent cause of abortion, but, otherwise, is of no immediate danger to the mother.

The **Continued Fevers.**—**Typhoid**, **Typhus**, and **Relapsing Fevers.**—If any of these fevers occur during pregnancy, the mother's life is in great danger, as uterine hæmorrhage and abortion frequently result. The fœtus often dies *in utero* from the high temperature.

Intermittent Fever.—Pregnancy is said to be protective against this disease. A second attack may be brought on by pregnancy in a woman who has previously had the disease, but its recurrence during pregnancy is accompanied by no special dangers. Abortion rarely occurs.

Pulmonary Diseases:—Acute Pneumonia during pregnancy is very fatal to the mother. Abortion is very frequent. The child often dies from the high temperature, or from asphyxia due to the circulation of impure blood in the maternal part of the placenta. **Phthisis.**—Phthisical women do not often become pregnant. If pregnancy occur, it tends to hasten the course of the disease, or it may cause a latent taint to develop.

Cardiac Disease.—Pregnancy has a bad effect on the course of cardiac disease; the chief symptoms (*œdema*, *dyspnœa*, *cyanosis*) are greatly aggravated. This is partly owing to the natural hypertrophy, and partly also to the increased strain thrown upon the heart during pregnancy.

Jaundice.—Simple jaundice is not uncommon in pregnancy. It may in some cases depend on pressure of the uterus on the bile-duct. Abortion frequently ensues, and the child is often jaundiced. Simple jaundice occasionally passes into the *malignant form*, accompanied with *yellow atrophy of the liver.*

Carcinoma Uteri.—Carcinoma in the early stage is no bar to conception. The growth is apt to be hastened by the co-existence of pregnancy, and, unless early abortion is induced, the obstruction may become so great as to necessitate the performance of Cæsarian section.

Ovarian Cysts may co-exist with pregnancy. Fatal results may ensue from rupture or inflammation of the cysts, and during labour they may give rise to obstruction. **Treatment.**—Tapping, or ovariotomy at an early period; induction of abortion.

Fibroids of the Uterus, if present, increase in size with the uterus, and also undergo involution after delivery. They may cause obstruction during labour, or give rise to post-partum hæmorrhage.

XI.—DISEASES OF THE DECIDUA.

Chronic Inflammation of the Decidua.—Causation.—It depends on endometritis existing previous to pregnancy, or on syphilis. **Morbid Anatomy.**—Hypertrophy and vascular polypoid growths of the decidua. **Termination.**—Abortion (due to hæmorrhage from the decidua, or to death of the fœtus) generally results.

Hydrorrhœa Gravidarum.—Symptoms.—Discharge of watery fluid from the uterus at intervals, commencing about the third month and continuing to the end of pregnancy. It is not of serious import. **Diagnosis.**—It is easily distinguished from *discharge of liquor amnii*, as it is not accompanied by the signs of commencing labour (uterine pains, dilatation of the os). **Source.**—It is said by some to arise from a chronic catarrhal inflammation of the decidua vera and its glands; by others, to be derived from the space between the chorion and amnion.

XII.—DISEASES OF THE MEMBRANES.

Hydramnios.—Definition.—An excessive amount of liquor amnii. **Causation.**—The excessive exudation of liquor amnii generally depends on some morbid condition of the decidua or chorion, which disturbs the placental circulation. In twins, it is occasionally seen in one amniotic sac, the other sac being normal. The **Symptoms** chiefly depend on the pressure of the distended uterus; thus, dyspnœa, displacement of the heart, and palpitation may arise from pressure on the diaphragm; by pressure on the abdominal veins, œdema of the legs and vulva may occur. Pregnancy very rarely goes on to full term, premature delivery generally occurring, either from over-distension of the uterus, or death of the fœtus. **Signs.**—The abdomen is greatly distended; the uterus tense and elastic, and occasionally fluctuating; the fœtal heart-sounds are very indistinct. On examination *per vaginam*, the lower part of the uterus is found greatly distended. **Diagnosis.**—This condition must be distinguished from distention of the abdomen due to *ascites*, and from *twins*. The free fluctuation, and the fact that the fluid changes its position when the patient is moved to one or the other side, and the absence of any defined uterine tumour, are the points which serve chiefly to distinguish ascites from hydramnios. The feeble heart sounds, the fluctuating tumour, and the impossibility of feeling any part of the fœtus, will distinguish hydramnios from twins. **Effects on Labour.**—The excessive distension of the uterus is apt to produce uterine inertia, and to prolong the first stage of labour. Post-partum hæmorrhage is liable to occur. **Treatment.**—The uterus should be supported by a bandage ; if symptoms of pressure arise, the membranes should be punctured and labour induced.

Deficiency of the Liquor Amnii.—This condition is occasionally present. By allowing the amnion to come in contact with the fœtus, adhesions may form and produce fœtal deformities.

Uterine Hydatids or Vesicular Mole.—In this the ovum is covered with clusters of semi-transparent vesicles, which are formed by *mucous degeneration and hypertrophy* of the *chorionic villi*. If this change occur before the formation of the placenta, the vesicles cover the entire surface of the ovum ; if after its formation, they are limited to the placental site. When the ovum is expelled from the uterus, the embryo has generally disappeared. **Causation.**—Syphilis has been assigned as a cause. In some cases it arises after death of the fœtus, the supply of nutrient material being then diverted from the fœtus to the chorionic villi. The **Signs of this Condition.**—Rapid growth of the uterus, so that at the third month it may reach to the umbilicus ; hence the enlargement does not correspond with the stage of pregnancy. The uterus has a boggy feel ; the heart-sounds and ballottement are absent. The *chief sign* is the discharge at intervals of clear fluid, blood, and the peculiar vesicles. Abortion generally occurs. **Treatment.**—The cervix should be dilated by a tent and by Barnes's bags, and ergot given internally. When the cervix is dilated, expulsion may be aided by the finger passed into the uterus.

XIII.—ABNORMALITIES AND DISEASES OF THE PLACENTA.

Abnormalities of the Placenta.—The placenta may be of **crescentic shape**; or it may be spread out over the entire ovum, forming the **Placenta membranacea.** Or, in addition to the ordinary placenta, several small detached pieces of placental tissue may be present—**Placentæ succenturiatæ.** These latter are of importance, as they may be left behind after labour, and give rise to hæmorrhage or septicæmia. **Hypertrophy** of the placenta may occur in the case of a large child, or of hydramnios. The placenta may be **small** if the child is small, or **atrophied** in cases where contraction has followed on placental hyperplasia. In the latter case the child often dies, owing to the interference with the placental circulation. The **position** of the placenta may be abnormal, as in **Placenta prævia.**

Placentitis (it is doubtful if true inflammation of the placenta occurs).—This term is applied to cases where development of new tissue takes place around the vessels of the villi. Afterwards this tissue contracts and obliterates the vessels, and *hæmorrhage on the surface of the placenta*, or *adhesions of the placenta*, result. It generally terminates in death of the fœtus and abortion.

Fatty degeneration of the placenta may depend on syphilis, or on fatty changes occurring in blood-clots. It attacks the chorionic villi and decidua, and is either localized or diffuse. Abortion frequently results.

Calcareous or pigmentary deposits, and occasionally **fibromatous, sarcomatous,** or **myxomatous** growths may be found in the placenta.

Syphilis of the Placenta.—If of *maternal* origin, it attacks the decidua, causing chronic inflammatory changes; if of *fœtal* origin, proliferation of connective tissue takes place in the chorionic villi, leading to obliteration of the vessels and fatty degeneration of the villi ; very often both maternal and fœtal parts of the placenta are attacked. Abortion frequently results.

XIV.—PATHOLOGY OF THE UMBILICAL CORD.

Abnormalities of Insertion.—Occasionally the cord runs to the margin of the placenta (**marginal insertion**) forming the **battledore placenta.** The vessels of the cord may break up and run in a membrane before reaching the placenta. The term **velamentous** is applied to this method of insertion.

Abnormalities in Number and Length.—Occasionally there are two cords. The cord may be very short (6 to 12 inches), or very long (60 inches). In the latter case it often becomes twisted round the neck or limbs, and may occasionally lead to spontaneous amputation of the limbs, or to death of the fœtus from obliteration of the umbilical vessels.

Abnormalities of the Vessels of the Cord.—There may be two veins and one artery, or a single vein and artery.

Knots of the cord are either due to the movements of the fœtus before birth, or they may be produced during labour by the child slipping through a loop of the cord. They very rarely obstruct the circulation through the cord.

Torsion of the Cord.—Twisting of the cord may occur, leading to partial or complete obstruction of the umbilical vessels, and occasionally to death of the fœtus. In such cases the cord is generally long, and the uterine cavity large and lax, so that the fœtus can move about freely.

XV.—MORBID CONDITIONS OF THE FŒTUS.

The fœtus during intra-uterine life may be attacked by various diseases, and may die *in utero*, or it may be born affected with disease.

The **Exanthemata.**—Small-pox, and probably measles and scarlet-fever, may be transmitted to the fœtus from the mother. The child often dies, and abortion occurs. In some cases the child is born with the marks of small-pox on it.

Syphilis.—According to the degree to which the fœtus is affected, it may be born dead with marks of the disease upon it, or alive marked by the disease, or the disease may not make its appearance till some time after birth. The child may receive the disease from the father or the mother, or both, and the mother may become affected through the child.

Intermittent Fever.—The fœtus may become affected *in utero* through the mother. When born, the child presents the peculiar enlarged spleen.

Lead Poisoning.—The fœtus may become affected and die when the mother suffers from lead-poisoning. Abortion often results.

Intra-Uterine Amputations.—Occasionally amputation of one or more limbs takes place *in utero*. In most cases it is due to constriction of the limb and stoppage of its circulation by bands stretching across the amniotic cavity. It may in some cases be due to constriction by coils of the cord. The limb, if small, disappears; if large, it is retained and expelled at birth with the child.

The following morbid conditions may affect the fœtus and produce obstruction during delivery: **Hydrocephalus, Meningocele, Spina bifida, Ascites, Distended Bladder, Enlargements of the liver, spleen, kidneys, and other parts,** due to cystic, cancerous, and other growths.

DEATH OF THE FŒTUS.

After death the fœtus *may be quickly expelled* from the uterus; or it *may be retained* for some time, owing to the presence of placental adhesions, or to the diminished irritability of the uterus.

Changes in the Retained Fœtus.—If *very small*, it may be dissolved in the liquor amnii; if *large*, it may either undergo **maceration**, the epidermis becoming raised in vesicles and peeling, the subcutaneous tissues red and œdematous, the body flaccid, the brain semi-fluid, and the cranial bones separated; or **mummification** may take place, the whole body becoming shrunken and dried up.

Missed Labour is a term applied to those cases (very rare) where uterine pains either do not come on at full term, or where they pass off quickly without expelling the fœtus. The fœtus dies, and is retained *in utero* for a longer or shorter time. The membranes generally rupture, and air gets access to the interior of the uterus; hence decomposition of the fœtus takes place. In consequence of this, the fœtus is disintegrated and discharged piecemeal for months. In other cases air is not admitted to the uterus; the fœtus then undergoes desiccation and calcification, and forms a **lithopœdion. Termination.**—Recovery may take place after the fœtus has been expelled, or the patient may die from septicæmia or from ulceration and rupture of the uterine walls. The **Treatment** in such cases would be, either to remove the fœtus entire after dilatation of the os uteri, or to use antiseptic vaginal injections and remove the parts of the fœtus as they come within reach.

Symptoms of Death of the Fœtus.—Death is often preceded by excessive movements of the fœtus, and by irregular beating of the fœtal heart. Death may be inferred to have taken place when the heart-sounds, which have been previously heard, are absent for a long time, and when the fœtal movements cease. After the fœtus is dead, the mother's breasts become flaccid, and she often suffers from depression of spirits, languor, and a feeling of heaviness in the hypogastrium.

XVI.—ABORTION, MISCARRIAGE, AND PREMATURE LABOUR.

Definitions.—By **abortion** is meant the expulsion of the ovum before the placenta is formed—*i.e.*, during the first three months of pregnancy; by **miscarriage**, expulsion between the fourth and seventh month—*i.e.*, before the fœtus is viable; by **premature labour**, expulsion between the seventh and ninth month—*i.e.*, after the fœtus is viable.

A **viable** fœtus is one that will have a fair chance of living after birth. A fœtus expelled before the seventh month will have very little chance of survival.

Pathology.—Hæmorrhage resulting from any cause, and tending to separate the attachments of the ovum, is likely to bring on abortion. If the bleeding is only slight, the pregnancy may go on uninterruptedly; but if profuse, the ovum is expelled, either immediately or after a time. In some cases the dead ovum is retained for weeks or months, the fœtus becoming dissolved or shrivelled; such an ovum, when expelled, consists of fœtal membranes with layers of decolourized and organized blood-clot, and is termed a **fleshy mole.** The hæmorrhage generally takes place between the decidua vera and decidua reflexa, but it may be seated between the decidua vera and uterine wall, or between the decidua reflexa and chorion; in some cases the blood may burst into and fill the amniotic cavity. Abortion is very liable to occur at a menstrual epoch, and is more common during the early months, owing to the loose attachments of the ovum.

Causation.—Abortion may be caused by:—

1. **Death of the Fœtus from any Cause**—*e.g.*, inflammation of the decidua, diseases of the placenta (syphilitic, etc.), diseases of chorionic villi, twisting of the cord, various diseases of the fœtus (syphilis, exanthemata, etc.).

2. **Certain Diseases of the Mother**—*e.g.*, the fevers, syphilis, alcoholism, lead-poisoning, etc. Some of these conditions may give rise to recurrent abortions, and occasionally several abortions may occur without any discoverable cause; in the latter case, the woman is said to have '**the habit of abortion.**'

3. **Uterine Contractions due to Nervous Influence,** such as fright, shock; or produced *reflexly* by sucking the breasts, or by the presence of worms in the intestines.

4. **Morbid Conditions of the Uterus.**—Fibroids, peritoneal adhesions, and displacements of the uterus, by interfering with the proper development of the uterus, are apt to cause abortion.

5. **Certain Mechanical Causes**—*e.g.*, a blow on the uterus, or a fall—may separate the ovum and cause abortion when any of the above predisposing causes are present, but probably not in a healthy woman.

6. **Criminal Abortion.**—Certain drugs (ergot, savin, etc.), and passage of various instruments through the cervix.

Symptoms.—Slight or profuse hæmorrhage, uterine pains, and expulsion of the ovum, are the chief symptoms. During the early months the ovum is expelled *en masse*, and may pass unnoticed in the clots; later on in pregnancy, however, the membranes rupture, and the fœtus is expelled first, and is followed after a time by the placenta and membranes. As long as any part of the membranes or placenta is retained, there is danger of hæmorrhage and septicæmia. Occasionally a portion of the placenta maintains its connection with the uterus, and forms the so-called **placental polypus.**

Treatment.—Preventive treatment in cases of habitual abortion depends on the cause; thus, if due to syphilis, mercury and iodide of potassium should be given. Rest at the menstrual epochs should be enjoined in those cases dependent on nervous irritability, or where no definite cause can be discovered. In some cases of habitual abortion at one certain time, it may be advisable to induce premature labour a little before the time when the fœtus usually dies.

Treatment in Cases of Threatened Abortion.—When there is only slight hæmorrhage, and the cervix is undilated, it is quite possible to prevent the abortion by absolute rest in bed, avoidance of movement, and by giving opium to allay restlessness.

If the os is dilated and the hæmorrhage profuse, **abortion is inevitable.** In such cases, if the ovum can be felt at the os, it should be scooped out of the uterus by the finger. When the os is not fully dilated, the vagina should be plugged and ergot given (a tent may be inserted into the cervix above the plug); in about eight hours the plug should be removed, when the ovum will often be found within reach, or the cervix sufficiently dilated to allow of its removal by the finger.

In cases where portions of the placenta or membranes are retained, the cervix should be dilated with tents, chloroform should be given, and the retained portions removed by the finger or curette.

As abortion is a frequent source of uterine disorder, the patient should remain in bed at least a week or ten days after expulsion of the ovum.

LABOUR.

XVII.—THE MUSCULAR MECHANISM OF LABOUR.

The **Forces concerned in Labour** are the contraction of the uterus and of the abdominal muscles, their combined action producing a force of about 50 lbs.

The **Uterine Contractions** are *involuntary* and *intermittent;* they commence at the fundus and pass with a quick wave-like movement to the cervix. At first they are slight and infrequent; afterwards they increase in intensity and frequency. The average duration of a pain (uterine contraction) is about one minute. During pregnancy slight *painless* contractions occur, but at the onset of labour they become *painful;* hence the term '**Pain**' is synonymous with *contraction.* The intermittent character of the pains is important, for, if continuous, they would stop the placental circulation and endanger the life of the child.

Effect of the Pains on the Uterus.—During a pain the uterus changes shape, becoming more globular. In consequence of the pains, the uterus thickens at the fundus, and the cervix becomes dilated and thinned out. This change in the cervix is partly due to the wedge-like action of the bag of membranes, and partly due to the traction exerted on the cervix by the longitudinal fibres of the body of the uterus.

Contraction of the Abdominal Muscles.—At first they are voluntary, but when the head reaches the pelvis they become reflex and involuntary.

Painful Character of the Contractions.—Some women have scarcely any pain; others, especially nervous women, suffer very acutely. The pain, while the os is dilating, is felt chiefly in the back, and shoots forwards across the abdomen; it is sharp and grinding in character. When the head reaches the pelvis, the pain is intensified owing to pressure of the head on the sacral nerves (causing cramp in the legs), on the vagina, bladder, and other soft parts in the pelvis.

Influence of the Pains on the Mother's Pulse, Temperature, etc.—The pulse-rate and the blood pressure increase during the pains and diminish in the intervals. The temperature rises during labour.

False Pains are certain irregular contractions occurring before the onset of labour. They are distinguished from true pains by the fact that they are irregular, and do not go on increasing regularly in force and frequency Again, they produce no effect (dilatation) on the cervix. False pains are felt most in the forepart of the abdomen, whilst true pains are felt chiefly in the back, and shoot thence forwards across the abdomen. False pains generally depend on an overloaded rectum, and disappear after the use of an enema.

Causation of Labour.—The reason why labour comes on at one definite time is not known. The following theories have been advanced to account for the onset of uterine action, but none are satisfactory :—(*a*) That the over-distended condition of the uterus, occurring at full term, induces labour. (*b*) That at full term separation of the placenta takes place, owing to fatty degeneration of the decidua. In consequence of this the ovum acts as foreign body, and brings on uterine contractions.—(Simpson.) (*c*) That the onset of labour at the tenth month is due to the congestion occurring at a menstrual epoch.—(Tyler Smith.)

XVIII.—CLINICAL PHENOMENA OF LABOUR.

Certain premonitory symptoms may occur during the week preceding labour, viz. :—

(*a*) **Sinking of the Uterus** into the pelvis. Hence the respiratory movements are often relieved ; but owing to increased pressure of the uterus on the pelvic contents (veins, nerves, and viscera), œdema of the legs increases, locomotion becomes more difficult, and rectal and bladder troubles often result.

(*b*) **Slight shortening of the Cervix** due to commencing contractions of the uterus.

(*c*) **A** *Show* may appear, consisting of blood-stained mucus derived from the cervix.

Labour is divided into Three Stages :—

The **First stage** *ends at the full dilatation of the os.* It generally lasts about 12 to 17 hours, and is longest in primiparæ.

The **Second stage**—the stage of expulsion—*terminates at the expulsion of the child*, and lasts about 1 to 2 hours. It is longest in primiparæ.

The **Third stage** *terminates when the placenta is expelled.*

First Stage of Labour.—Gradual dilatation (beginning at the os internum) and thinning of the cervix occur. The os is felt as a thin circular ring which gradually increases in size and becomes tense during the pains. The protruding bag of membranes is felt. During the pains the membranes become tense ; and at the end of this stage they usually rupture spontaneously, and part of liquor amnii escapes, the rest being retained *in utero* by the presenting part plugging the cervix. Occasionally the membranes are very tough, and require artificial rupture, and in rare cases the fœtus is born surrounded by the unruptured membranes—*the caul.* When the cervix is completely dilated, it forms with the vagina a continuous canal. Towards the end of this stage reflex vomiting frequently occurs, owing to distension and irritation of the cervix. The patient often walks about during this stage.

Second Stage of Labour.—After rupture of membranes the pains soon return with increased intensity, and are of a bearing-down character. The abdominal muscles now come into play, and the patient favours their action by fixing the diaphragm and by lying with her body flexed. For the same reason she also fixes her body by pressing her feet against the foot of the bed, and by grasping a towel fixed to the bed-head. The presenting part gradually advances during the pains and recedes in the intervals, till eventually it reaches the perineum. The perineum is alternately relaxed and distended, and the contents of the rectum often expelled by the intermittent pressure of the presenting part, which finally glides over the perineum and is born, and is quickly followed by the rest of the body. After the body, the remains of the liquor amnii and blood clots are expelled.

Third Stage of Labour.—After expulsion of the child, the pains cease for a short time, and then return and detach the placenta; further contractions lead to its expulsion into the vagina or externally. When expelled spontaneously the placenta glides out sideways, and little bleeding results; if, however, the cord is pulled upon, it is expelled with the fœtal surface first, and may act by suction on the uterine vessels, and lead to hæmorrhage. During the detachment of the placenta the maternal vessels are torn across, but hæmorrhage is prevented by clotting and by closure of the uterine sinuses by contractions of the uterus. After expulsion of the placenta, the uterus contracts to the size of the fœtal head.

XIX.—MECHANISM OF LABOUR.

Varieties of Presentations.—(*a*) **Head presentations**: the vertex, brow, or face may present. (*b*) **Pelvic presentations**: the breech, foot, or knee may present. (*c*) **Transverse presentations**: the shoulder or hand may present. Vertex presentations occur in about 95 per cent. of cases.

VERTEX PRESENTATIONS.

In **Vertex presentations** the head enters the pelvic brim in or near one of the oblique diameters, with the occiput anterior or posterior. There are, therefore, four positions of the vertex, named according to the position of the occiput.

Positions:—

1. **Left Occipito-Anterior.**—The long diameter (occipito-frontal) of the head enters in the right oblique diameter of the pelvis, the occiput being directed towards the left pectineal eminence, and the forehead towards the right sacro-iliac synchrondrosis.

2. **Right Occipito-Anterior.**—The head enters in the left oblique diameter, occiput towards right pectineal eminence, forehead at left synchondrosis.

3. **Right Occipito-Posterior.**—Head lies in right oblique diameter, but its position is the reverse of No. 1.

4. **Left Occipito-Posterior.**—Head in left oblique diameter, but its position is the reverse of No. 2.

The most common position is No. 1. This is due to the fact that, in the erect position of the mother, the child naturally gravitates with its back directed towards the mother's left side.

Position of the Child in Left Occipito-Anterior Position.—The back is directed to the mother's left side, and its right shoulder to the front. The right parietal bone is the part of the head first felt (presenting), owing to the inclination of the pelvis. The sagittal suture lies in the right oblique diameter; the posterior fontanelle can be felt, but the anterior is out of reach.

Mechanism in Left Occipito-Anterior Positions.—The following movements are undergone by the head in its expulsion: (*a*) *descent*, (*b*) *flexion*, (*c*) *rotation*, (*d*) *extension*, (*e*) *external rotation.*

Descent and **Flexion** generally go on simultaneously. The head enters the pelvis in the axis of the brim, with the biparietal diameter parallel to the plane of the brim. Owing to the greater resistance experienced by the forehead, flexion of the head occurs, and the occiput descends lowest, the chin being bent on the sternum. This flexion depends on the fact that the head can move like a lever on the vertebral column, having a long arm stretching towards the forehead, and a short arm towards the occiput; pressure, therefore, applied to the head, either through the liquor amnii or by the passages, will act with greater effect on the frontal arm of the lever, and hence cause flexion. The object of this flexion is to substitute a shorter diameter of the head—the occipito-bregmatic—for the long occipito-frontal diameter.

Rotation.—As the head descends towards the pelvic floor, the pressure of the left ischiatic spine guides the occiput over the ischium (*anterior inclined plane*) towards the pubes, the right spine guiding the forehead back over the sciatic ligaments (*posterior inclined plane*) towards the hollow of the sacrum, till eventually the long diameter of the head has rotated into the antero-posterior diameter of the pelvis. The occiput then lies under the pubic arch, with the neck fixed against the pubes.

Extension.—After alternately protruding and receding, the head eventually distends the perineum. The nape of the neck is fixed at the pubes, and the force of the uterus being transmitted to the fore-part of the head, **extension** occurs, and the forehead and face sweep over the perineum and are born.

External Rotation. — After its birth, the head rotates through quarter of a circle, the occiput turning towards the mother's left thigh, and the face to the right. This is chiefly owing to the shoulders entering the pelvis in the left oblique diameter, thus carrying the head into a position parallel to the right oblique.

Expulsion of the Trunk.—The shoulders lie in the left oblique diameter at first, and are rotated, by the same mechanism as the head, into the antero-posterior diameter of the outlet. The right shoulder then becomes fixed at the pubes, and the left sweeps over the perineum and is born. The rest of the trunk is quickly expelled.

Mechanism of Position No. 2 (*Right Occipito-Anterior*) is precisely similar to that of Position No. 1.

Mechanism of Positions Nos. 3 and 4 (*Left and Right Occipito-Anterior*).—In the third position the left parietal bone presents; in the fourth, the right. The mechanism is similar in both cases. **Complete flexion** generally occurs, and the **occiput rotates forwards**, so that they usually terminate as occipito-anterior positions. If, however, complete flexion does not occur, and it is possible to feel the anterior fontanelle, one of three things may happen :—

1. **The Occiput may rotate forwards after a time.**

2. **The Occiput may turn into the hollow of the Sacrum, and the Face to the Pubes.** In such a case, spontaneous delivery of the head occasionally occurs. The occiput is forced over the perineum, the neck is fixed in front of the perineum, and by a movement of extension the forehead, face, and chin are expelled from behind the pubes. Generally, however, instrumental aid is necessary.

3. **A Face presentation may be produced** in rare cases if the head is small, by the head becoming extended.

Changes in the Shape of the Head produced by Labour.—Owing to the moulding of the head consequent on the pressure exerted on it by the walls of the passages, great changes occur in its shape. The antero-posterior diameter is increased, and the transverse diminished.

Caput Succedaneum is the swelling, due to venous congestion and œdema, which forms on the presenting part where it is subjected to *least pressure—i.e.*, over the os uteri and vaginal canal. It varies *in size* with the length of the labour and the resistance of the parts. It varies *in situation* with the position of the head; thus, in the first and fourth positions it is seated on the right parietal bone; in the second and third, on the left.

The changes in the shape of the head and the caput succedaneum disappear in a few days.

XX.—MANAGEMENT OF NATURAL LABOUR.

Examination of the Patient.—Inquiries should be made as to the time when the pains commenced and the membranes ruptured (if that event has taken place). Information also about former pregnancies and labours should be obtained. The position of the child should be made out by abdominal palpation. The fœtal heart should be ausculted. The condition of the cervix and pelvis, and the part presenting, should be ascertained by a vaginal examination, made during a pain, and in the intervals between the pains. If the os is found less than an inch in diameter, and the pains are weak and infrequent, and the head presents, the patient may be left for a short time. When the parts are well dilated, the pelvis roomy, and the pains strong, a short labour may be expected; with the reverse conditions the labour will probably be prolonged; the exact duration, however, it is impossible to foretell.

Management of the First Stage.—If necessary, the urine should be drawn off, and the rectum unloaded by an enema. Examinations should be made hourly to estimate the degree of dilatation of the cervix, but too early rupture of the membranes should be carefully avoided, lest it lead to the loss of the fluid dilating wedge formed by the bag of membranes and so prolong the labour. The membranes generally rupture spontaneously, but if the os is fully dilated, labour may be sometimes hastened by puncturing them with a knitting-needle, or by sawing through them with the notched finger-nail. During this stage the patient should walk or sit, so as to facilitate the entrance of the head into the pelvic brim.

Management of the Second Stage (*Propulsive*).—After loss of the liquor amnii a lull generally occurs in the pains, but they soon return with greater intensity, and become bearing down in character. To favour the action of the abdominal muscles the patient should be instructed to hold her breath during the pains in order to fix the diaphragm, and she should lie on her left side with her feet supported, and her hand grasping a fixed towel as mentioned in a previous section. If the pains flag, they should be excited by rubbing and pressing the uterus. Should the **anterior lip** of the os uteri get **pressed between the head and the pubes,** it must be pushed up during the intervals of the pains, and kept up during the pains till the head has passed it. **Rupture of the perineum** is liable to occur if the perineum is rigid from any cause, or if the occiput is directed posteriorly. Attempts should be made to preserve it intact, either by pulling the perineum forwards over the head by means of two fingers in the rectum, the thumb being placed on the head to restrain its progress during the pains; or the perineum may be pushed forwards over the head by the thumb and finger placed on either side of the perineum, the tips of the fingers being applied to the head to restrain its progress as much as possible. If rupture seems inevitable, two small lateral incisions may be made into the perineum, as they will prevent extensive rupture occurring and present a clean-cut healing surface. If rupture occur, insert a few silver sutures at once.

The head when expelled should be supported by the right hand, the left hand '*following*' the uterus down as the child is expelled, and pressing on it to excite contractions if the expulsion is too slow. If a coil of the cord encircle the child's neck, the cord should be pulled down so as to slacken it and allow the shoulders to pass through the loop. Should delay occur after the birth of the head, and the child begin to get blue in the face, traction may be made on the posterior shoulder by the finger in the axilla. When the body is expelled tie the cord two inches from the navel with two ligatures an inch apart, and cut between the ligatures.

Management of the Third Stage.—After expulsion of the child, the hand should be kept on the uterus to prevent it dilating. The placenta generally comes away of itself without any artificial aid, but if its expulsion is delayed longer than twenty minutes, **pressure downwards and backwards** should be exerted on the uterus during a pain; by this means the placenta is forced into the vagina or completely outside. **Traction** on the cord **should not be attempted**, as it conduces to hæmorrhage (*vide previous section*). After the placenta has come away, Ext. Ergot. Liq. ʒi. should be given, and the hand kept on the uterus for about twenty minutes to ensure contraction. A well-fitting binder should be applied before leaving the patient.

Management of Occipito-Posterior Positions.—Rotation of the occiput forwards occurs in most cases. As **complete flexion** of the head **is essential** to allow of this rotation, **pressure upwards and backwards on the forehead** during a pain is occasionally of service; the same object is also attained by applying **traction downwards on the occiput** with the fillet or vectis. If rotation of the occiput forwards does not occur, **the forceps will be necessary.**

XXI.—FACE PRESENTATIONS.

Frequency.—They occur once in 250 labours.

Causation.—In these cases the head is extended, and the face enters the pelvis in one of the oblique diameters. The presentation is often produced at the commencement of labour by the occiput hitching above the pelvic brim or in the concavity formed by a latero-verted uterus. The occiput thus becomes fixed, and the uterus continuing to act, forces down the face. In some cases the tendency to the formation of face presentations is favoured by the shape—*dolichocephalous*—of the head. In this the occiput is prolonged further backwards than normal, and hence does not descend so readily when the uterine contractions commence.

Diagnostic marks (by means of which the presentation is recognised).—The forehead, bridge of the nose, margin of the orbits, the mouth and alveolar processes, and the chin. If the cheeks are swollen, the presentation might be mistaken for the breach and the mouth for the anus, but the alveolar ridges inside the mouth and the above-mentioned marks will readily distinguish it.

Classification of Positions.—There are four positions, named according to the position of the chin.

1. **Right Mento-Posterior.**—The long diameter of the face (fronto-mental) lies in the right oblique diameter of the pelvis, the chin being directed towards the right sacro-iliac synchondrosis, and the forehead towards the left pectineal eminence. The back of the child lies to the mother's left side.
2. **Left Mento-Posterior.**—Face in the left oblique diameter; chin towards the left sacro-iliac synchondrosis.
3. **Left Mento-Anterior.**—Reverse of No. 1.
4. **Right Mento-Anterior.**—Reverse of No. 2.

The Mechanism of Delivery consists of several distinct acts, and is similar to that of vertex presentations, the chin taking the place of the occiput.

Descent and extension generally go on together. Owing to the greater resistance experienced by the forehead during descent, extension of the head occurs, and the chin descends lowest. In the first position the right cheek presents.

Rotation.—The chin is rotated forwards by the same mechanism as the occiput in vertex presentation, so that the face comes to lie in the antero-posterior diameter of the pelvis, with the chin at the pubes and the forehead in the hollow of the sacrum.

Flexion now occurs. The chin is fixed under the pubes, and owing to flexion of the head, the mouth, nose, brow, and vertex gradually glide over the perineum, and so the head is born.

External rotation occurs just as in vertex presentations, and is due to the same cause.

In **most cases** the head is delivered by the natural forces in the above manner. In some cases, however, the chin, instead of rotating forward, passes back into the hollow of the sacrum. The head and neck then become jammed in the pelvis, and **natural delivery is rarely accomplished**, unless the head is very small and the pelvis very large, in which case the chin may pass in front of the perineum, and the head be born **by flexion.**

Changes in the Head in Face Presentations.—The antero-posterior diameter of the head is much increased, and the caput succedaneum seated over the malar bone.

Prognosis.—The children are often still-born, owing to the great pressure on the neck. The mother is only subjected to the risk of a protracted labour.

Management of Face Presentations.—If complete extension of the head occurs, and the chin rotates forwards, no interference is necessary. When rotation forwards of the chin does not occur, pressure upwards and backwards on the forehead during a pain should be made in order to favour the production of extension and rotation ; or rotation may be cautiously attempted with the short forceps. By some, version is advised ; by others, traction on the occiput with the fillet to convert it into a vertex presentation.

In cases where the chin passes backwards, the forceps or craniotomy become necessary.

XXII.—BROW PRESENTATIONS.

The head in these cases lies between flexion and extension, and is often spontaneously converted into a vertex or face presentation.

Causation.—The same as in face presentations.

Diagnostic Marks.—The anterior fontanelle, the forehead and orbits.

Management.—Pressure upwards should be exerted on the forehead or occiput during the pains in order to convert it into a vertex or face presentation. If this change cannot be effected, the forceps should be applied. The head may then be born by flexion, the superior maxilla becoming fixed against the pubes, and the forehead, vertex, and occiput gradually sweeping over the perineum. If the forceps fail, craniotomy becomes necessary.

XXIII.—PELVIC PRESENTATIONS.

The breech, foot, or knee may present.

Frequency.— They occur about once in 45 labours.

Knee presentations are very rare.

Causation.—Breech presentations occur most often in multiparæ and premature deliveries. Their production is favoured by contraction of the pelvis, excess of liquor amnii, and lax uterine walls. Presentation of the foot may be due to movement of the fœtus, or to the foot slipping down when the liquor amnii is suddenly discharged.

Prognosis.—There is no special danger to the mother, but to the fœtus there is great danger, because of the tendency to asphyxia produced by pressure of the head on the cord. One out of every eleven children dies.

Diagnosis.—**By external examination** the head can be felt at the fundus uteri, and the heart is often heard beating above the umbilicus to one or other side. **By vaginal examination** the bag of membranes is found protruding in the form of a long narrow pouch (this is the case in most malpresentations). The liquor amnii escapes in one gush, because the breech does not accurately fill the cervix and retain part of the fluid, as is the case in vertex presentations. The **Diagnostic marks of the presentation** are the buttocks, the movable coccyx, the spinous processes of the sacrum, and the anus. **If the foot presents**, it is distinguished from the hand by the big toe being parallel to the other toes, and not capable of opposition, as is the thumb. The inner border of the foot is thicker than the outer ; in the hand both borders are of equal thickness. The ankle is less movable than the wrist. The projection of the os calcis is also peculiar to the foot.

If the knee presents, it is distinguished from the elbow by the presence of the movable patella, which contrasts with the immovable olecranon of the elbow.

The **positions of the breech** are four in number, named according to the position of the sacrum.

(*a*) **Dorso-anterior**
  1. **Left Sacro-Anterior,** sacrum directed towards the left pectineal eminence (most common position).
  2. **Right Sacro-Anterior,** sacrum directed towards the right pectineal eminence.

(*b*) **Dorso-posterior**
  3. **Right Sacro-Posterior,** sacrum directed towards the right sacro-iliac joint.
  4. **Left Sacro-Posterior,** sacrum directed towards the left sacro-iliac joint.

Position of the Child in Dorso-Anterior Positions.—In the left sacro-anterior position the child lies with its back directed towards the mother's left side and forwards; its abdomen is directed backwards, and to the mother's right side. The left buttock, which lies to the front, presents, owing to the inclination of the mother's pelvis.

Mechanism of Delivery in Dorso-Anterior Positions.—**Descent** of the breech takes place, and **rotation** forwards of the anterior hip is produced (by the same mechanism as in vertex presentation), so that the hips are brought into the antero-posterior diameter of the outlet. The anterior hip becomes fixed behind the pubes, and the posterior hip distends, and then sweeps over the perineum and is born; the anterior hip quickly follows. The shoulders pass down in the same oblique diameter as the hips, and rotate in the same way; the anterior shoulder then becomes fixed at the pubes, and the posterior sweeps over the perineum. The arms are generally born before the shoulders, but occasionally they become extended over the head, if traction is made on the trunk before they are expelled, and may cause difficulty in delivery of the head. The head enters the pelvis in the opposite oblique diameter to the hips, and **becomes flexed** on the chest; it then **rotates,** and the occiput is thus brought against the pubes. The nape of the neck is then fixed under the pubes, and the chin, face, and vertex are gradually expelled over the perineum.

Mechanism in Dorso-Posterior Positions.—The abdomen of the child is directed forwards, and either to the left or right. As **descent** occurs, rotation forwards of the anterior hip and shoulder takes place, as in dorso-anterior positions, and birth occurs in the same way. The head also generally rotates so as to bring the occiput forwards, and it is then born as in dorso-anterior positions. Occasionally, however, the occiput **does not rotate forwards,** but **passes back into the hollow of the sacrum,** and the face turns towards the pubes; in such a case birth may occur in one of two ways: (*a*) the nape of the neck becomes fixed in front of the perineum, and strong flexion occurring, the face, forehead, and vertex are gradually pushed out from under the pubes; (*b*) occasionally the chin hitches above the pubes, and extension of the head occurs, so that the face looks upwards; in such a case, if the head is small, or the pelvis very roomy, the occiput, vertex, and face may gradually sweep over the perineum.

Management of Breech Cases.—Carefully avoid rupturing the membranes too early, and do not apply traction to the trunk till the arms are born, for fear lest they become extended above the head. As soon as the breech is born, the cord should be placed on one side of the sacral promontory, so as to lessen the pressure of the head upon it. The pulsations of the cord should be carefully watched. If the arms do not slip down, but become extended over the head, they will require releasing. **Method of releasing the Arms.**—Carry the child's body well forward, then pass two fingers over the posterior shoulder and gradually sweep the arm across the face and chest; avoid bending the arm at right angles, for fear of breaking it. Then carry the body well backwards, and release the anterior arm in the same way. When the arms are born, the child's body should be raised towards the mother's abdomen; and traction may now be applied to the trunk if expulsion of the head is delayed. Expulsion of the head may also be aided by pressure *per rectum,* with the fingers on the forehead or superior maxilla, or by pressing on the uterus through the abdominal walls.

In **Dorso-Posterior cases,** rotation of the anterior hip forwards may be aided by traction applied to the groin; and again, rotation of the face backwards may be assisted by pressure backwards, during a pain, on the side of the forehead nearest the pubes. If, however, the face passes to the front, and the occiput into the hollow of the sacrum, traction should be applied backwards on the trunk, so as to cause the face to sweep from under the pubes. If the head becomes extended, and the chin hitched above the pubes, the body should be drawn forwards, so as, if possible, to sweep the occiput and vertex over the perineum; if this is impossible, the forceps or perforation of the head become necessary.

Management of Breech Cases when Arrested from Uterine Inertia or Pelvic Contraction.—If the breech is above the brim, chloroform should be given, and a foot should be brought down by the hand passed into the uterus, and traction exerted on it. If the breech is arrested in the pelvis, it can often be delivered by traction applied over the groin with the index-finger or blunt hook. Embryotomy may be necessary if these means fail.

The mechanism and management of footling and knee cases is essentially the same as when the breech presents.

XXIV.—TRANSVERSE PRESENTATIONS.

In these cases the shoulder, elbow, or hand may present. The child lies obliquely across the uterine cavity. Natural delivery is very rare, as the shoulder forms the apex of a wedge (the base being formed by the head and chest), which becomes jammed and fixed in the pelvis. Interference is therefore necessary in all cases.

Frequency.—Transverse presentations occur once in about 260 cases of labour.

Causation:—

1. Any condition which prevents the head from engaging in the brim, or occupying the lower segment of the uterus, may cause the head to pass to one side, and the shoulder to slip into its place—*e.g.*, contracted pelvis, placenta prævia.

2. Undue obliquity of the uterus may cause the head to hitch above the pelvic brim, and the shoulder to sink into its place.

3. Excess of liquor amnii, by allowing too great mobility of the fœtus, favours its production.

4. In some cases it may be due to the transverse diameter of the uterus being relatively too long; this is said to account for the successive recurrence of transverse presentations in the same woman.

Diagnosis:—

By **External Examination** the long axis of the uterus is found transverse. The hard resisting head may be felt in one iliac fossa, and the breech in the other. By **Vaginal Examination** the membranes are found in the form of a narrow pouch; the presenting part is often high up, but, if within reach, the shoulder, elbow, or hand may be made out.

Diagnostic Marks of the Shoulder.—The sharp edge of the acromion, the spine of the scapula; sometimes the fold of the axilla may be felt, and as it looks towards the feet it will indicate the positions of the head and breech.

Diagnostic Marks of the Elbow.—The olecranon, with the two condyles on either side.

Diagnostic Marks of the Hand.—The fingers are more easily separated than the toes, and the thumb can be carried across the palm.

In the operation of turning it is often important to know the exact position of the child's body.

Method of Ascertaining the Position of the Child.—It may be possible by external examination to make out the position of the head and breech. In some cases, by the vaginal examination the axilla can be felt, and from its direction the position of the breech is known. As to whether it is a dorso-anterior or dorso-posterior position, the spine of the scapula and the clavicle, if they can be felt, will indicate respectively the position of the child's back and abdomen. If still in doubt, an arm should be brought down, and the palm of the child's hand placed in the palm of the examiner's right hand: if the thumbs come into apposition, the hand presenting is the right; but if not, it is the left. This decides which side of the child lies lowest. If the hand is held supine, the thumb will point towards the head; hence the positions of the head and breech are known. Having ascertained this, the directions of the abdomen and back are known.

Prognosis.—As regards the mother, it is fair if treated at an early stage, but unfavourable if the shoulder becomes jammed into the pelvis. The maternal mortality is 1 in 9; nearly half the children die.

Positions:—

A. **Dorso-Anterior** (*child's back directed forward*).	**1. Head in right iliac fossa.** **2. Head in left iliac fossa.**
B. **Dorso-Posterior** (*child's back directed backward*).	**3. Head in right iliac fossa.** **4. Head in left iliac fossa.**

Mechanism of Delivery.—In very rare cases delivery is effected naturally by **spontaneous version**, or by **spontaneous evolution.**

Spontaneous Version is a term applied to cases where a head or breech is spontaneously substituted for a transverse presentation. Such a change can only occur, when the fœtus is freely movable in the uterus, either before the escape of the liquor amnii, or immediately after. It is said to depend on partial or irregular contractions of the uterus.

Spontaneous Evolution.—If this occur, the child is born with its shoulder presenting. The child is subjected to great pressure, and the shoulder is forced down and fixed against the lower border of the pubes. Round the shoulder, as a fixed point, the rest of the body rotates, the thorax, breech, and legs following in succession, and finally the opposite shoulder and head.

Management of Transverse Presentations.—Neither of the above methods can be relied on in practice. Immediately the case is recognised, version should be attempted by external manipulation or the bi-polar method; if these fail, the hand should be passed into the uterus and podalic version performed. If version is impossible, embryotomy must be resorted to.

XXV.—COMPLICATED PRESENTATIONS.

These are rare cases where more than one part of the body presents; there are two chief kinds:

1. **When a hand or foot presents with the head** there is rarely any difficulty, as the head generally enters the brim alone, and even if both enter, the head is generally born without much difficulty when the pelvis is roomy. If, however, the pelvis is narrow and both enter, the head may become fast. **Management:** Attempts should be made to push the hand or foot upwards between the pains, and to favour engagement of the head in the brim by pressure on the fundus; if this fail, place the limb where there is most room, *i.e.*, on one side the sacral promontory.

2. **When a foot and hand present together,** the foot should be retained, and traction made on it so as to prevent the possibility of a transverse presentation arising.

XXVI.—FUNIS PRESENTATION—PROLAPSE OF THE CORD.

In these cases the cord falls down past the presenting part; and, owing to pressure on the cord, the child may die from asphyxia.

Causation.—The production of prolapse is favoured by excess of liquor amnii, by too long a cord, and by sudden escape of the liquor amnii. Again, any condition which prevents the presenting part from engaging in and accurately filling the pelvic brim, or the lower part of the uterus, such as pelvic contraction, placenta prævia, malpresentations (especially transverse), conduces to prolapse of the cord.

Diagnosis.—The cord forms a soft movable mass, in which pulsations are felt. The coils of the cord can be felt after rupture of the membranes. During a pain the pulsations often stop.

Prognosis.—There is no danger to the mother, but there is great danger of the child dying from asphyxia, owing to compression of the cord by the presenting part. Half the children die.

Treatment.—The great indication in treatment is to relieve the cord from pressure. The membranes should be left intact as long as possible, in order to get complete dilatation of the os and to lessen the pressure on the cord. Attempts may be made to replace the cord by one of the following methods :

1. **Knee-Chest Position.**—The patient is placed on her knees and chest so that the cord can slip down the anterior surface of the uterus ; the cord is then taken in the hand and pushed beyond the presenting part during the intervals of the pains. After replacement of the cord, engagement of the head in the brim should be brought about by pressure on the uterus, and in order to prevent a return of the cord, the patient should lie on her side with her hips raised by pillows.

2. **Another method** consists in pushing the cord up with the fingers past the presenting part between the pains, and in trying to produce engagement of the head by pressure on the uterus during the pains.

3. **Another method.**—A loop of string is passed down a catheter and brought out at the eye ; the prolapsed cord is placed in the loop. By pushing the catheter up into the uterus the cord is carried with it above the presenting part. There are several special instruments made on this principle.

If replacement fail, the child may be born alive if the pains are strong and the pelvis roomy ; it is best, however, to place the cord on one side the sacral promontory so as to preserve it from pressure as much as possible, and to hasten the labour by artificial means—by the forceps if the head is within reach, or by turning if the head is movable above the brim.

XXVII.—PROLONGED LABOUR.

When labour is prolonged from any cause, serious effects may arise. If the delay occur in the **first stage**, it is not so serious, as the liquor amnii serves to protect both mother and child from injurious pressure. If, however, the labour is protracted during the **second stage**, the mother is in danger, owing to the pressure exerted by the head on the soft parts of the pelvis; the child also is in danger, partly from the pressure exerted on its head, and partly because stoppage of the placental circulation is liable to occur, owing to the compression of the placenta between the contracted uterus and the child.

The appearance of the following symptoms during a protracted second stage would be of dangerous import, and would indicate the necessity for immediate interference :

Quick pulse, increased temperature, hot dry skin, vomiting, vagina hot and dry. If delivery is not quickly brought about, sloughing of the vagina may take place, and the patient may pass into a typhoid condition, with low muttering delirium, and death may eventually occur from exhaustion. By early interference these dangers may generally be avoided.

Causes of Prolonged Labour :

(*a*) **Uterine Inertia**, *i.e.*, defective and irregular uterine contractions.

(*b*) **Abnormal resistance due to narrowing of the soft or bony parts of the pelvis.**

(*c*) **Malformations or malpresentations of the fœtus.**

XXVIII.—UTERINE INERTIA.

Definition.—Defective and irregular uterine pains, or total absence of uterine action occurring during labour.

Causation.

(*a*) **Excess of Liquor Amnii**, by over-distending the uterus, more or less paralyzes its action.

(*b*) **Malpositions of the Uterus**, such as anteversion or latero-flexion, by causing the uterus to act at a disadvantage, render the pains inefficient.

(*c*) **The Presence of a Distended Bladder, Ascites, or an Ovarian Tumour** may cause the pains to be inefficient by weakening the effect of the accessory abdominal muscles.

(*d*) **A Loaded Rectum** may cause defective pains.

(*e*) **Feeble Health, Exhaustion, Excitement, Fright,** may suspend the action of the uterus.

The Treatment of Inertia depends on the cause; thus, if due to hydramnios, the membranes should be punctured; if a loaded rectum is the cause, an enema should be given; if a distended bladder, the urine should be drawn off. If the uterus is anteflexed, an abdominal bandage must be applied, and the patient should lie on her back; if latero-flexion exists, she should lie on the side opposite the flexion. During the first stage, if the pains are inefficient and very painful, 20 grains of chloral or 20 drops of laudanum should be given; this will often produce a few hours' sleep, after which the pains will come on more regularly and efficiently. In some cases of delay from inertia, pressure with the palm of the hand on the fundus is often useful in effecting delivery. If there is still no progress, the forceps should be used.

Ergot should not be used unless the passages are fully dilated and there is no obstruction. It is generally best to discard its use altogether till after the placenta is expelled, as it may exhaust the mother by the continuous uterine contraction it induces, and may imperil the life of the child by stopping the placental circulation.

XXIX.—LABOUR OBSTRUCTED BY ABNORMAL CONDITIONS OF THE MATERNAL SOFT PARTS.

The following conditions may cause obstruction during the first stage of labour :—

1. **Abnormal Rigidity of the Cervix.**—This condition often delays the first stage, especially if the membranes are ruptured

too early. In such cases the uterine contractions are spasmodic, and very painful.

2. **Adhesions of the Lips of the Os Externum** dependent on inflammation of the cervix. The os is recognised as a small pit.

3. **Cicatrization of the Cervix,** due to the healing of lacerations produced in former labours.

4. **Hypertrophy of the Cervix,** especially of the anterior lip.

5. **Carcinoma of the Cervix** : if only of slight extent, dilatation may occur ; if extensive, the tissues may break down and give rise to much hæmorrhage.

Treatment of Cervical Obstruction.—In cases of rigid cervix, the painful contractions are relieved by chloral, and dilatation often progresses steadily after its use ; if necessary, dilatation may be assisted by Barnes's bags.

Dilatation by Barnes's bags often suffices in cases of cicatrization or hypertrophy, or slight degrees of cancer of the cervix, assisted in some cases by slight lateral incisions into the cervix.

In cases of complete closure of the os, chloroform should be given, and a crucial incision made into the cervix and dilatation effected by Barnes's bags.

In some cases of great obstruction of the cervix depending on cancer or cicatrization, craniotomy or Cæsarian section may be necessary.

The following conditions may obstruct labour during the second stage :—

1. **Partial Closure of the Vagina from Cicatricial Contraction,** depending on previous syphilitic, traumatic, or other ulceration.

2. **Various Abnormal Conditions at the Vaginal Orifice.**—Rigid perineum, œdema of the vulva, thrombus of the vulva and vagina, are the most important ; in the first case, rupture is liable to occur, and in the two last, sloughing may take place from pressure. Other less important conditions are, adhesions of the labia, vaginismus, rigid hymen ; they rarely, however, occasion much delay.

3. Various Tumours, etc., by Encroaching on the Pelvic Space.

(*a*) **Fibroids**, if seated in the upper part of the uterus, may give rise to inefficient pains and post-partum hæmorrhage; if, however, they are seated in the lower segment, they may, by occupying part of the pelvic cavity, cause obstruction.

(*b*) **Ovarian tumours**, if of large size, rise out of the pelvis and only cause delay by producing uterine inertia; but if small, they may remain in the pelvis and cause obstruction. In consequence of the pressure to which they are subjected they may rupture, or strangulation and necrosis of the cyst may ensue.

(*c*) **Prolapse of the anterior vaginal wall**, containing the distended bladder (**cystocele**), may obstruct delivery.

(*d*) **Prolapse of the distended rectum** (rectocele) may protract labour.

(*e*) **Vaginal Hernia.**—Protrusion of the posterior vaginal wall, containing folds of intestine, may produce obstruction. Strangulation of the gut may occur.

(*f*) **Vesical calculus** may occasionally be the cause of obstruction, and the pressure may lead to vesico-vaginal fistula.

Treatment of the above conditions :—

In cicatricial narrowing of the vagina, if the obstruction does not yield naturally, it may be aided by dilating bags; occasionally incisions are necessary. The treatment for rigid perineum is given in a previous section. In œdema of the vulva make several punctures to let out the serum. In thrombus of the vulva and vagina, if small, deliver quickly by the forceps, if large, incise the swelling and turn out the clots, controlling the bleeding by pressure of the finger and application of solution of perchloride of iron. If the obstruction is due to a fibroid, attempts should be made to push it above the pelvic brim, so as to remove it from pressure; in some cases it may be removed by the écraseur or enucleation. Failing this, the forceps, craniotomy, or even Cæsarian section must be resorted to, according to the degree of contraction. If an ovarian cyst obstructs, it should be punctured and pushed above the brim out of the way; if this fail, the forceps or craniotomy will be necessary. In the case of a distended bladder causing obstruction, the urine should be drawn off with the catheter, but if the urethra cannot be found, the bladder must be aspirated and pushed above the presenting part. If the obstruction depends on a distended rectum, an enema should be given. In vaginal hernia the gut should be reduced if possible. In vesical calculus the stone should be pushed above the brim ; but if this cannot be done, it should be crushed, or removed by rapidly dilating the urethra.

XXX.—LABOUR OBSTRUCTED BY ABNORMAL CONDITIONS OF THE BONY PARTS OF THE PELVIS.—PELVIC DEFORMITIES.

Chief Varieties of Deformed Pelvis :—

1. **Pelvis œqualibeter justo-minor** (uniformly contracted pelvis).—In this there is really no deformity ; all the diameters are proportionately diminished. It is seen in dwarfs, in cases where development is arrested, and in cases of scrofula. It may cause great obstruction during labour.

2. **Pelvis œqualibeter justo-major** (uniformly enlarged pelvis). There is no deformity ; all the diameters are proportionately increased. It may be the cause of precipitate labour.

3. **Infantile Pelvis.**—In this the infantile shape is retained owing to premature ossification of the pelvic bones. The transverse diameters of the brim and outlet are narrow ; the sacrum is straight ; and the pubic arch narrow. Difficulty may arise in labour.

4. **Masculine Pelvis—Funnel-shaped Pelvis.**—This form is seen in muscular women. The brim is generally natural in size, but the cavity is deep, and all the diameters of the outlet are narrowed, hence obstruction will generally increase towards the outlet.

5. **Flattened Pelvis.—Rickety Pelvis.**—This is the most common variety of deformed pelvis, and is generally due to rickets. **Characters.**—The conjugate of the brim is shortened; the sacral promontory projects forwards; the sacrum is more curved than natural; the brim is kidney-shaped, and occasionally, owing to projection backwards of the pubes, its shape resembles the figure 8. The deformity of rickets is chiefly due to the weight of the body pressing the base of the sacrum downwards and forwards; but the rotation backwards of the apex of the sacrum is prevented by the sciatic ligaments, hence the increased curvature of the sacrum. Displacement of the pubes backwards depends on the action of the recti muscles. Occasionally in rickets the brim is further deformed by a lateral curvature of the spine, which throws the **sacral promontory forwards and to one side.** In rare cases, when rickets is late in its onset and comes on after the child has begun to walk about, the pelvis may assume the shape of that of **osteo-malachia.**

6. **Spondylolisthetic Pelvis.**—In this the last lumbar vertebra is dislocated forwards in front of the sacral promontory, so **as to narrow the conjugate of the brim** The obstruction may be so great as to necessitate Cæsarian section. This deformity may depend on caries, rickets, or congenital dislocation.

7. **Obliquely Contracted Pelvis of Nægelé.**—In this there is ankylosis of the sacro-iliac joint on one side, associated with defective development of the lateral half of the sacrum and os innominatum of the same side. The sacrum is displaced towards the ankylosed side and the pubes towards the healthy side. The oblique diameter, measured from the sacro-iliac joint on the healthy side to the acetabulum of the diseased side, is shortened. Great deformity may be produced, and cause corresponding obstruction during labour. **The cause** of the deformity is ankylosis of the sacro-iliac joint, associated with pressure upwards on the acetabulum through the femur on the same side.

8. **Robert's Transversely-Contracted Pelvis.**—This is a rare deformity, depending on ankylosis of both sacro-iliac joints. The transverse diameter and conjugate of the brim are shortened; the ischia are pressed inwards, and narrow the transverse diameter

of the outlet. The obstruction is very great, and Cæsarian section is often required.

9. **The Kyphotic Pelvis** has the conjugate of the brim increased owing to the rotation of the base of the sacrum backwards. The transverse diameter of the brim and all the diameters of the outlet are lessened. The pubic arch is narrow. The obstruction increases towards the outlet.

10. **Pelvis deformed by Osteo-Malacia.**—This disease produces softening of the pelvic bones. Owing to the pressure exerted on the softened bones the following deformities arise : The sacral promontory projects forward ; the sacrum is very curved ; the lateral walls of the pelvis are pressed inwards at the acetabula, so as to shorten both oblique diameters ; the tuberosities of the ischia and sides of the pelvis are pressed towards one another, and thus the dimensions of the cavity and outlet are greatly lessened. The pubes often project forwards and become beaked. Great deformity is thus produced, and craniotomy or Cæsarian section may be necessary ; occasionally, however, the bones are plastic and allow the fœtus to pass.

11. **Deformities depending on Exostoses, Tumours, etc.**—Exostoses, malignant growths of the sacrum and other pelvic bones, may encroach on the pelvic cavity, and cause obstruction, and injury to the overlying soft parts during delivery. Cæsarian section may be required.

Influence of Deformed Pelvis on Pregnancy and Labour.

In cases of deformed pelvis, the uterus is often anteverted, and pendulous abdomen is very common ; the uterus is also higher and more movable than natural, as it cannot sink into the pelvis. Malpresentations are very common, partly owing to the great mobility of the uterus, and partly because the anteverted condition of the uterus and the pelvic contraction tend to carry the head away from the brim. During labour the difficulty of course varies with the degree of contraction ; the pains are always strong, but the mobility and anteversion of the uterus prevent them from acting efficiently. If the deformity is slight the pains may effect delivery.

Influence on the Mother.—Pelvic contraction, especially if at all great, is a serious matter for the mother, as she is exposed to the danger of exhaustion from excessive uterine action, and also to the risk of contusions and sloughing of the uterus, cervix and vagina, as well as to the danger of the various operations necessary.

Influence on the Child.—Owing to the great pressure to which the head is subjected, and also owing to the liability to prolapse of the cord, the prognosis as regards the child is unfavourable. The caput succedaneum is large. Contusions of the scalp are often present, and generally disappear in a few days. Occasionally the pressure causes ulceration and suppuration of the scalp.

The cranial bones overlap greatly, and very often a large depression is produced near the coronal suture by pressure against the sacral promontory; the depression generally disappears after labour. Intra-cranial hæmorrhage occasionally results from the compression of the head.

The Diagnosis of Contracted Pelvis is derived from :

(*a*) **The History and General Examination.**—The history of rickets and of previous protracted labours, and the presence of deformities of the limbs and spine, would lead to the suspicion of contracted pelvis.

(*b*) **Pelvic Measurements.** $\left\{\begin{array}{l}\text{1. } \textit{External Measurements.}\\ \text{2. } \textit{Internal Measurements.}\end{array}\right.$

1. **External Measurements** are very useful; they do not supply us with knowledge of the exact internal measurements, but any deviation from their normal relation points to deformity internally. The measurements are obtained by means of Baudclocque's or other callipers, which are simply modifications of carpenters' compasses.

The three most important external measurements are :

i. **The distance between the two anterior superior iliac spines,** which normally measures 9½ inches.

ii. **The distance between the mid-points of the two iliac crests,** measuring normally 10½ inches.

iii. **The External Conjugate Diameter.**—This is the distance measured from just below the spine of the last lumbar vertebra to the upper margin of the symphysis pubis. The average measurement is 8 inches, and it is about 3¼ inches longer than the internal conjugate. According to Spiegelberg, if the measurements (i) and (ii) are less than normal, but if their relation is unchanged, the pelvis is probably uniformly contracted; if the measurement (ii) is normal, but the measurement (i) is increased, the conjugate of the brim is probably contracted; if both (i) and (ii) are diminished, but their relation is abnormal (the measurement (i) being as great as, or even greater than (ii)), the pelvis is probably uniformly contracted and has a shortened conjugate.

Occasionally in thin women the sacral promontory can be felt by pressure through the abdominal walls, and the distance between it and the upper margin of the symphysis pubis (**internal conjugate**) can be measured.

2. **Internal Measurements.**—Various instruments (pelvimeters) are used for obtaining the internal pelvic measurements, but the best is the hand. The chief internal measurement to be obtained is the **diagonal conjugate diameter**—*i.e.*, the distance between the lower margin of the symphysis and the sacral promontory. This measurement, minus half an inch, will give the conjugate diameter of the brim (**true conjugate**).

Method of Measuring the Diagonal Conjugate.—The index and middle fingers are introduced into the vagina, and the posterior vaginal wall is pressed backwards by the tip of the middle finger till it reaches the sacral promontory, the radial border of the hand resting against the lower margin of the symphysis. The distance, between the tip of the middle finger and the point of the hand where it is touched by the symphysis, is the measurement of the diagonal conjugate. As the fingers are introduced in ordinary vaginal examinations it is not possible to touch the sacral promontory; if the sacral promontory can be felt in this way, some degree of contraction may be inferred.

The **Mechanism of Delivery in Contracted Pelvis.**—If the degree of contraction is slight, by moulding of the head delivery may occur naturally. The mechanism, by which the head passes the obstruction, varies with the kind of contraction. In **cases of contracted conjugate** the head enters the pelvis in the transverse diameter, having the sagittal suture near the sacral promontory, owing to the oblique position of the head. The small bi-temporal diameter of the head engages in the narrowed conjugate, and by slight extension the head passes the contraction and brings the anterior fontanelle a little lower than the posterior; strong flexion and descent now occur, and rotation and birth of the head take place in the usual way. In slight cases of **uniformly contracted pelvis**, strong flexion of the head may occur, and it may be born without help.

If the obliquity of the head is very great, as shown by the sagittal suture lying near or even above the sacral promontory, we may infer that the conjugate is very small, and that operative interference will be needed. Again, if the face present in a case of contracted pelvis, interference will be necessary.

Management of Labour in Cases of Contracted Pelvis.—As a rule, one of the following operations will be required, according to the degree of contraction: use of the forceps, version, induction of premature labour, craniotomy, Cæsarian section.

Forceps and Version.—If the internal conjugate measures *from* 4 *down to* 3¼ *inches*, and the head is engaged in the brim, the **use of the forceps** is indicated; if, however, the head is freely movable above the brim, **turning** would probably subject the mother to less risk of injury, and should be resorted to in preference to the forceps. When the conjugate measures *from* 3½ *to* 2¾ *inches*, **version** should be performed, The head, when it enters the pelvis with the base of the skull foremost, passes a contraction more readily than it does if it enters with the vertex first. This is partly owing to the fact that the widest diameter of the base is narrower by half an inch than the bi-parietal diameter, and partly because the small bi-temporal diameter engages in the conjugate. Further, the bulk of the head is more readily diminished by over-riding of the bones at the sagittal suture when the head follows the body than when it precedes it; hence the preference given to turning in the greater degrees of contraction. If the forceps and version fail in the above cases, or if the conjugate measures *from* 3 *to* 1½ *inches*, **craniotomy** alone, or **craniotomy** and **embryotomy**, become necessary. When the conjugate measures 1½ *inches and under*, or when in the above cases the child cannot be extracted after craniotomy, **Cæsarian section** is indicated as a last resource.

The above numbers are expressed in a tabular form by Leishman, as follows :—

If the conjugate measures 4 to 3¼ in., the forceps is indicated
„ „ „ 3½ to 2¾ in., version is indicated.
„ „ „ 3 to 1½ in., craniotomy is indicated.
„ „ „ 1½ in. and under, Cæsarian section is indicated.

Induction of Premature Labour.—In many cases, when the existence of contraction is known in early pregnancy, it is best to induce premature labour at a time when the head will pass the contraction. Thus, according to Scanzoni—

In 2½ inches conjugate, labour should be induced at 30th week.
In 3 inches „ „ „ „ 33rd „
In 3½ inches „ „ „ „ 36th „

After the labour has been induced, it may be assisted, if necessary, by version or forceps.

In cases where the deformity is so great that there is no chance of a viable child passing the obstruction, abortion should be induced at an early period of pregnancy.

XXXI.—ABNORMAL CONDITIONS OF THE FŒTUS OBSTRUCTING DELIVERY.

A. Obstruction caused by the Head :—

Hydrocephalus.—Owing to the increased size of the head, serious obstruction may arise, and if not treated early the soft parts of the pelvis may be injured, and the child's life endangered. The children are generally still-born. **Diagnosis.**—Refusal of the head to enter the pelvis, although the pains are good and there is no pelvic contraction, would lead to the suspicion of hydrocephalus. By a careful examination the large size of the head, the abnormal width of the sutures, and the fluctuation of the fontanelles, may be made out. **Treatment.**—The cranium should be punctured with a trochar, and the fluid drawn off; the size of the head is thus lessened, and it may then be born naturally, or by the help of the forceps or version. If this fail, craniotomy becomes necessary.

Meningocele.—In this the meninges are protruded by fluid in the occipital or frontal region. If obstruction arise, puncture with the aspirator.

Large Size of the Fœtal Head, with premature closure of the sutures and fontanelles, may cause obstruction, as the head is incompressible. **Treatment.**—Forceps or craniotomy.

B. Obstruction Caused by Other Parts :—

1. **Hydrothorax, ascites, distension of the urinary bladder, spina-bifida,** may occasionally lead to obstruction after birth of the head. **Treatment.**—The fluid should be drawn off by the aspirator.

2. **Tumours** (cystic, malignant, etc.) of the liver, kidney, and other parts; **protrusion of enlarged viscera** through congenital deficiencies of the abdominal walls, may cause obstruction. **Treatment.**—Evisceration, if necessary.

3. **Other Congenital Deformities,** such as acardiac and anencephalous monsters, rarely cause any obstruction, though they may puzzle the diagnosis.

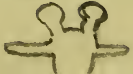
C. Obstruction due to Double Monsters.

According to Playfair there are four principal varieties of double monsters :—

1. Two bodies united in front by the thorax or abdomen; this is the most common variety.

2. Two bodies placed back to back and united by the lower part of the spine.

3. Dicephalous monsters, having two separate heads on a single body.



4. Two separate bodies having the heads partly or wholly united.

Mechanism of Birth and Management.—In most cases, as the children are small, delivery is effected by the natural forces. If, however, they become arrested, craniotomy or embryotomy may be necessary.

D. Other Conditions, such as Difficult Cases of Twins and Mal-presentations, may obstruct labour, and are treated of under their respective sections.

XXXII.—PRECIPITATE LABOUR.

Definition.—Sudden onset and rapid termination of labour depending on excessive uterine contractions and great laxity of the passages.

As a rule no harm results, but occasionally laceration of the cervix and perineum occurs, or the cord is broken and the child, being suddenly born when the mother is unprepared, may be injured by falling to the ground. **Treatment.**—The action of the voluntary muscles of labour should be stayed by chloroform or by a hypodermic injection of morphia.

XXXIII.—ABNORMAL PREGNANCY.

Pregnancy may be abnormal, (*a*) *as regards the number of ova impregnated and developed,* (*b*) *as regards the site where the ovum is developed.* The consideration of the first abnormality embraces the subjects of **multiple pregnancy** and **superfœtation** ; of the second, the various kinds of **extra-uterine pregnancy.**

MULTIPLE PREGNANCY.

Definition.—Simultaneous development of more than one embryo.

Frequency, etc.—Twins occur once in 89 births, triplets once in 7,000, quadruplets and quintuplets are extremely rare. According to Duncan, multiple births are most common in first pregnancies, but after that the tendency to multiple pregnancy increases with each successive pregnancy. The greatest number of twins are of opposite sexes, next most commonly there are two females; two males being the least common.

Etiology (*in twins*):

1. **They may arise from impregnation of two ova** from the same or separate Graffian follicles. In such a case each fœtus has a separate placenta, chorion and amnion.

2. **Two Embryos may arise from the same ovum.**—There is a single placenta and chorion common to both embryos, but as a rule each is enveloped by its own amnion; occasionally, however, absorption of the partition wall between the two amniotic sacs occurs, so that both embryos come to lie in the same amniotic cavity. Twins arising from the same ovum are generally of the same sex, those arising from different ova are of opposite sexes. As regards **Triplets,** they arise generally from two ova, one of which gives rise to two embryos; hence one embryo will have a separate placenta and a complete set of membranes, the other two having a common placenta and chorion, but separate amnions.

Characters of the Children.—Twins and triplets are small, and are often born prematurely. Twins are frequently unequally developed at birth, and occasionally one of the children dies *in utero*, and may be expelled before the other, or, becoming flattened and mummified, it may be retained and expelled at full time with the other child. This difference in the development of the two children is not dependent on difference in age, but is probably brought about by one fœtus pressing on and preventing the development of the other.

The mortality of twins is about 1 in 13. It is very rare for all the children of triplets to survive.

Diagnosis.—Unusual size of the abdomen, irregular shape of the uterus, palpation of two bodies, with a depression between them, presence of double-heart sounds heard at different parts of the abdomen, and separated by an interspace, over which no sound is audible, are the chief signs which characterize the presence of twins. Very often the condition is not recognised till after the birth of the first child.

Labour and its Management in Multiple Pregnancies.—In about 50 per cent. of cases both children present by the head; in 30 per cent. the head of one and the breech of the other child presents; in about 8 per cent. both breeches present. As a rule no difficulty arises in delivery, the first child being born in the ordinary way, and the second following in ¼—½ hour.

The **first stage** of labour is apt to be *prolonged*, as the uterus acts at a disadvantage through both sets of membranes, and again during or after the **third stage** *hæmorrhage* is liable to occur owing to the atonic condition of the uterus, produced by the previous over-distension. After the birth of the first child, its cord should be tied and its placenta left in the uterus till the second child is born.

The pains generally return in about 20 minutes to ½ an hour, and quickly expel the second child; if any delay occur, the uterus should be stimulated to contraction by pressing and rubbing the fundus and by rupturing the membranes. If delivery of the second child is urgently indicated owing to hæmorrhage, etc., it may be extracted quickly by turning or the forceps.

After birth of both children the two placentæ are expelled in the ordinary way. By compression and a binder strong contraction of the uterus should be secured and the tendency to hæmorrhage lessened.

Difficult Cases of Twins and their Management.

(*a*) Both Heads Presenting.

1. *Occasionally both Heads present, and each prevents the other from entering the Brim.*—In such a case it is best to push up one head and apply the forceps to the other, and cause it to enter the pelvis.

2. *Interlocking of the two Heads.*—In some cases one head enters the pelvis and is followed by the other head, which becomes jammed against the neck of the first and thus prevents delivery. **Treatment.**—If possible push up the head of the second

child while the first is extracted by the forceps; if this is not possible, the head of the second child must be perforated, and the first child extracted by the forceps, and after it is born the second extracted. or evisceration of 1st child –

(*b*) **Interlocking of the Chins when the First Child is born by the Breech and the Second presents by the Head.—Treatment.**—Attempts should be made to push the head of the second child out of the way and then to deliver the first; if this is not possible, it will be necessary to decapitate the first child and deliver its body, leaving its head behind in the uterus to be extracted after the birth of the second child; or the head of the first child may be perforated and extracted; or the head of the second child may be perforated and the first child delivered, followed by extraction of the second child.

(*c*) **A Foot or a Hand may descend with the Head.—Treatment.**—Endeavour to push the limb out of the way. [illegible]

(*d*) **All Four Feet may present.—Treatment.**—Engage one child by traction as quickly as possible.

SUPERFŒTATION.

Definition.—A term applied to a few cases of multiple pregnancy, in which it is supposed that, after partial development of one ovum, a second ovum is fertilized and developed. It is very doubtful if this is possible.

Such cases as the following are brought forward as instances: (*a*) delivery of two fœtuses at different stages of development; (*b*) delivery of a full-term child, and after a time delivery of another child, also fully developed; (*c*) delivery of two children, one being black, the other white (hence having different fathers).

Most of the cases can be explained on the theory that they are twins, one of the children being undeveloped in consequence of the pressure exerted on it by the other child, and either being expelled thus with the fully developed child, or remaining behind *in utero* till development is completed. Some of the cases may be due to a second pregnancy occurring in one horn of a bilobed uterus.

EXTRA-UTERINE FŒTATION.

Definition.—Implantation and development of an ovum at some point external to the uterine cavity.

Varieties (after Playfair) :

1. **Tubal.**—Ovum fixed and developed in the Fallopian tube.
    (*a*) *Interstitial ;* ovum seated in that part of the tube traversing the uterine walls.
    (*b*) *Tubo-ovarian ;* ovum seated between the ovary and outer fimbricated extremity of the Fallopian tube.
2. **Abdominal.**—Ovum seated in the abdominal cavity.
    (*a*) *Primary ;* ovum implanted in the abdominal cavity from the commencement of development.
    (*b*) *Secondary ;* fixation of a partially developed ovum, derived from a ruptured tubal pregnancy.
3. **Ovarian.**—Impregnation of the ovum whilst it is in the Graffian follicle, where it remains and undergoes development. This variety is very rare.
4. **Development of an Ovum in the rudimentary Horn of a bi-lobed Uterus.**—This variety is closely allied to the tubal variety.
5. **Hernial.**—Passage of an ovum into a hernial sac, where it undergoes development.

Etiology.—Any cause which diminishes the calibre of the tube and prevents the passage of the ovum down the tube, but allows the spermatozoa to pass upwards, *e.g.*, constriction of the tube, due to catarrh, spasm, peritonitic adhesions, polypi in the tube, pressure on the tube by uterine and other tumours, may give rise to this condition.

The Tubal Variety.—Anatomical Characters.—The mucous membrane of the Fallopian tube undergoes hypertrophy and forms a decidua, into which the chorionic villi of the ovum dip, but no distinct placenta is formed. The muscular tissue of the tube also increases in amount. If the pregnancy is interstitial, the muscular fibres of the uterus form an outer covering to the ovum ; if seated at the fimbriated extremity the cyst can increase in size so as to resemble the abdominal variety. Sympathetic changes take place in the uterus, resulting in the formation of a true decidua and softening of the cervix. **Termination.**—By the gradual growth of the ovum the tube becomes greatly thinned and stretched, and hence **rupture** generally occurs between the fourth and twelfth week, and death ensues from hæmorrhage or peritonitis. In some cases, however, the ovum, after escaping from the tube, engrafts itself in some part of the peritoneal cavity and is thus **converted into the secondary abdominal variety.** Tubal pregnancy very rarely goes on to full term. Very similar to this variety, both in its anatomical characters and mode of termination, is the pregnancy which occasionally takes place in the rudimentary horn of a bi-lobed uterus.

Symptoms.—This condition is often not suspected till rupture has occurred. The presence of the mammary, menstrual and cervical signs of pregnancy, associated with the occurrence of a slight bloody uterine discharge and the presence of a rounded fluctuating tumour on one side or behind the uterus (as discovered by vaginal, rectal, and bimanual examination), would be symptomatic of tubal pregnancy. When rupture occurs, it is accompanied by great abdominal pain, followed quickly by symptoms of collapse, and after a time by peritonitis if the patient survives long enough. **Treatment, if discovered before Rupture has occurred.**—Various methods have been recommended with a view to causing death of the embryo (as after death it remains inert), *e.g.*, puncturing the cyst with the trochar or aspirator, injections of morphia and other poisons into the cyst, passage of an electric current through the cyst. The cyst has been cut into through the vagina, by means of the galvano-cautery, and the fœtus removed. **If rupture occur,** stimulants should be given in order to tide the patient over the shock. If she rallies from the collapse, the treatment will have to be directed to the peritonitis which will ensue. It has been proposed to perform gastrotomy after rupture has occurred, and to remove the tube and its contents.

The Abdominal Variety.—Anatomical Characters.—In this form the ovum either primarily, or after the escape of a tubal fœtation, becomes fixed to some part of the peritoneal cavity, *e.g.*, the intestines, the iliac fossa, Douglas' pouch, etc. The ovum sets up inflammation, and by the exudation of inflammatory material a more or less complete cyst is developed around it. This cyst contains maternal vessels, and acts as a decidua, in which the chorionic villi are imbedded. A placenta is formed and the pregnancy often goes on to full term. The empty uterus becomes slightly enlarged, and its mucous membrane forms a true decidua.

Termination.—(*a*) The cyst occasionally ruptures either during pregnancy or at full term, and causes death from internal hæmorrhage. (*b*) In rare cases the fœtus dies owing to stoppage of the placental circulation and remains innocuous for a longer or shorter time. The tissues of the fœtus may undergo fatty degeneration; or desiccation of the fœtal tissues and mummification may take place, resulting in the production of a **lithopœdion.** (*c*) The fœtus may die and putrify, and by setting up peritonitis or septicœmia, cause death. (*d*) Most commonly after death of the fœtus the sac inflames and suppurates, and then opens either through the abdominal wall or into the vagina, bladder or bowel; as air enters the sac, decomposition of the fœtus takes place, and it is discharged piecemeal through the opening of the sac. Recovery may occur from closure of the sac, more especially if it opens by the abdominal walls, or death may take place from exhaustion caused by the long suppuration.

Symptoms and Diagnosis.—Some of the signs of pregnancy are present, such as the change in the breasts, absence of the normal menstrual discharge. Attacks of abdominal pain occur during pregnancy, owing to the peritonitis set up by the ovum, and very often a slight bloody uterine discharge is present.

By vaginal examination the tumour is found not to have the natural shape of the uterus, and very often it has its long axis placed transversely; towards full time, parts of the fœtus can be felt. **By vaginal examination** the uterus is found displaced by the tumour, its size is very little increased, and it may be made out to be separate from the tumour. **The passage of the uterine sound** should only be resorted to when there is a doubt in the diagnosis ; in a case of abdominal pregnancy it would, of course, show the uterine cavity to be empty, and only slightly increased n size.

At full term, uterine pains come on, blood and decidual *débris* escape from the vagina, and if not treated, one of the terminations above-mentioned will take place.

Treatment.—**Gastrotomy** should be performed. The mother has the best chance of survival if the operation is delayed till after the fœtus is dead. By delay, the placental circulation becomes obliterated, and hence the risks of hæmorrhage are lessened ; and further, adhesions between the cyst and abdominal walls are more likely to have formed, and so the risks of blood escaping into the peritoneum are avoided. Primary gastrotomy, *i.e.*, gastrotomy immediately labour pains come on, is very fatal to the mother, as there exists no apparatus in the cyst wall for preventing hæmorrhage from the placental site. **The operation.**—An incision should be made in the middle line, and the cyst, having been drawn up to the incision, should be opened and the fœtus extracted. The placenta should be left in the cyst. The cyst and abdominal walls are closed by sutures, except at the lower part ; through the opening thus left a drainage tube should be inserted to allow free exit for the placental *débris*. Peritonitis and septicæmia may follow the operation.

XXXIV.—HÆMORRHAGE BEFORE DELIVERY.

The term **Unavoidable Hæmorrhage** is used in reference to that occurring in cases of Placenta Prævia ; the term **Accidental Hæmorrhage** is applied to cases of hæmorrhage arising from the detachment of the normally seated placenta.

A. PLACENTA PRÆVIA—UNAVOIDABLE HÆMORRHAGE.

Definition.—Attachment of the placenta to the lower segment of the uterus.

Causation.—It occurs more often in multiparæ, and probably its production is favoured by a dilated uterine cavity.

Its production has been attributed to: (*a*) the falling down of an impregnated ovum to the lower part of the uterus; (*b*) incomplete abortion, the ovum partially developed becoming separated from its normal attachments in the upper part of the uterus, and engrafting itself on the lower; (*c*) impregnation and fixation of an ovum in the lower part of the uterus.

There are three varieties:

1. **Placenta prævia centralis**; os internum completely covered by the placenta.
2. **Placenta prævia partialis**; os internum partly covered by the placenta.
3. **Placenta prævia marginalis**; placenta reaching up to the margin, but not covering the os internum.

Frequency.—It occurs once in 570 cases of pregnancy.

Symptoms and Pathology.—The first symptom is sudden loss of blood, occurring without warning or pain. The bleeding soon stops, and is followed after a time by successive hæmorrhages, which increase in amount as pregnancy advances. When once hæmorrhage has occurred the patient is never safe, as profuse and fatal bleeding may occur at any time. The first hæmorrhage rarely occurs before the sixth month. By examination **per vaginam** during pregnancy, the cervix is found long and soft; the vaginal fornix has a soft and boggy feel; ballottement is obscure, and if the attachment is central the spongy placenta may be felt through the os. The bleeding that occurs during pregnancy arises from the uterine vessels, which are laid bare either by accidents, such as a sudden fall, or by slight dilatation of the lower segment of the uterus caused by uterine contractions, and leading to slight detachment of the placenta. When labour commences, the hæmorrhage becomes excessive owing to successive detachments of portions of the placenta from the lower part of the uterus; the blood escapes from the exposed uterine vessels between the pains, but is expelled from the uterus during the pains. The bleeding arises from that area of the uterus which undergoes dilatation during the first stage of labour, *i.e.*, the part within a radius of 2 inches from the os internum; as soon, therefore, as the placenta is detached over this area the bleeding stops. The hæmorrhage also ceases when the placenta is completely detached; after rupture of the membranes, it also ceases as the presenting part comes down and presses on the open vessels. If the hæmorrhage is profuse during pregnancy or labour, it may give rise to restlessness, pallor, thready pulse, ending in some cases in convulsions and death; there is also danger of post-partum hæmorrhage, owing to the relaxed atonic condition of the uterus.

Mal-presentations (of the shoulder, breech, etc.) are very common in placenta prævia, because the uterine cavity is large, and labour is often premature, and also because the placenta prevents the head from occupying the lower segment of the uterus.

Diagnosis.—Hæmorrhage occurring during the last three months of pregnancy, coupled with the vaginal signs above mentioned, would be diagnostic of this condition.

Prognosis.—The prognosis is unfavourable both for the mother and child. One mother in four dies, and half the children die either at birth, or soon after.

Treatment.—If the bleeding comes on before the seventh month and is only slight, it may be possible, by rest in bed and application of ice to the abdomen and vulva, to stop the hæmorrhage till the child is viable. If, however, the **hæmorrhage is profuse**, whether the child is viable or not, labour should be brought on immediately, as any recurrence of the hæmorrhage may prove fatal. The membranes should be punctured and the vagina plugged, or a Barnes's bag inserted into the cervix; by this means the hæmorrhage is controlled and the cervix dilated. In about eight hours, the plug or Barnes's bag should be removed, and if the os is dilated, and the hæmorrhage stopped, and the presentation normal, the case may be left to nature; if, however, the hæmorrhage still keeps on, **version** should either be performed and the labour concluded, or, if the head is well within reach, the **forceps** may be applied. As the hæmorrhage comes from an area of about 2 inches radius from the os internum, and as it ceases when the placenta is detached over this area, separation of the placenta by the finger from this area is recommended by Barnes with a view to controlling the bleeding.

Turning in Placenta Prævia.—If the placental attachment is marginal the operation is easy enough. When the attachment is central the fingers should be passed gradually between the edge of the placenta and the uterine wall till the membranes are reached; turning should then be performed, and a leg should be seized and brought down into the cervix. The presence of the limb in the cervix acts as a plug, and prevents the hæmorrhage.

B. HÆMORRHAGE FROM DETACHMENT OF NORMALLY SEATED PLACENTA—ACCIDENTAL HÆMORRHAGE.

Definition.—Hæmorrhage from separation of the placenta during pregnancy or labour, the blood either remaining **concealed** (*i.e.* collecting) in the uterus, or **escaping** from the uterus and vagina.

Causation.—It may be due to accident, *e.g.*, a fall, or a blow on the uterus, or to strong uterine contractions causing separation of the placenta; again, it may arise from the same causes which bring on abortion (*vide* section on abortion), such as syphilis, the different fevers, placental disease, etc.

Symptoms.—When the blood escapes from the vagina the case is easily made out. When it remains *concealed*, symptoms of collapse (thready pulse, pallor, coldness of surface, etc.), with pain of a stretching character referred to the uterus come on. The collected blood may cause bulging of some part of the uterus. The uterine pains are feeble or absent. **Diagnosis.**—This condition might be mistaken for rupture of the uterus, as both are accompanied by symptoms of collapse; rupture of the uterus, however, occurs at a late stage of labour, after the membranes are ruptured, and is accompanied by recession of the presenting part, whilst concealed hæmorrhage takes place during pregnancy, or early labour, and there is no recession of the presenting part.

Prognosis.—In the concealed form it is bad both for the mother and child; when the blood escapes externally, it is more favourable, as the nature of the case is readily made out and treated.

Treatment.—The membranes should be ruptured, and a firm binder applied over the uterus ; the bleeding may then cease, and the labour may be left to nature ; if however the hæmorrhage still continues, and the os is not dilated, Barnes's bags should be used, and the labour finished by turning or forceps.

XXXV.—POST-PARTUM HÆMORRHAGE.

Definition.—Hæmorrhage during or shortly after the third stage of labour. The blood generally flows from the open vessels at the placental site, but it may come from lacerations of the cervix and vagina.

Causation.—The chief natural agent preventing post-partum hæmorrhage is **the muscular contraction of the uterus** which closes the uterine sinuses ; hæmorrhage is also to a certain extent prevented by **formation of thrombi** in the veins. Any condition which interferes with the action of these agents is liable to cause hæmorrhage.

(*a*) *Conditions producing atony and leading to imperfect contraction of the uterus*, and, therefore, predisposing to hæmorrhage, are protracted labour, over-distension of the uterus from hydramnios or twins, ante-partum hæmorrhage, exhaustion.

(*b*) *Conditions interfering with the proper contraction of the uterus* are retained placenta, clots in the uterus, peritoneal adhesions, tumours of the uterus.

(*c*) *The condition interfering with the formation of thrombi* is increased blood pressure in the abdominal and pelvic vessels, such as is produced by suddenly getting up, coughing, straining, etc.

Symptoms.—The bleeding may commence immediately, or some hours after the placenta is expelled. It may be gradual or sudden in its onset, and may be slight and easily arrested, or copious and producing faintness, feeble pulse, pallor and coldness of the skin, restlessness, and in some cases convulsions and death. Recovery generally occurs.

Treatment.—**Prophylactic** treatment consists in the proper management of the third stage of labour. In all cases efficient contractions of the uterus should be ensured by giving Ext. Ergot. Liquid ʒ j, after expulsion of the placenta, and by manual compression of the uterus, after which a well-fitting binder should be applied. If the pulse rises after labour, and if the uterus does not firmly contract, hæmorrhage is likely to occur.

Curative Treatment.—When hæmorrhage has occurred there are three indications for treatment :—

(*a*) *To produce uterine contraction.*

(*b*) *To cause thrombosis.*

(*c*) *To revive the patient.*

To Produce Uterine Contraction.—Gently knead and compress the uterus ; pass the hand into the uterus and clear out the placenta and clots, and give a full dose of ergot ; this will generally suffice. If the hæmorrhage still continues, endeavour to excite contractions by placing pieces of ice inside the uterus, or by carefully injecting cold or hot water (temperature 112°) into the uterus. The child should be placed at the breast in order to excite contractions reflexly. The Faradaic current (if near at hand) may be used to stimulate the uterus. Compression of the aorta may be of service in temporarily arresting the hæmorrhage.

To Cause Thrombosis.—This indication should only be followed out when the above measures fail. Perchloride of iron is the best styptic, and it may be applied cautiously to the uterine surface through a syringe, or the cavity may be swabbed out with it (Liquor Ferri Perchlor. one part, water six parts, is the strength to be used). The perchloride acts by causing thrombosis in the vessels, by corrugating the surface and also by causing uterine contraction. It should only be used when other means have failed, owing to the danger of the disintegrating clots giving rise to septic poisoning. Tincture of iodine has also been used locally with the same object. If the bleeding come from laceration of the cervix, vagina or perineum, the iron solution should be applied to the torn surface. A firm binder should be applied before leaving the patient.

To Revive the Patient.—The patient's head should be lowered and the foot of the bed raised. Stimulants should be given by the mouth, or ether or a solution of ammonia may be injected subcutaneously. If the collapse is very great, transfusion of blood may be performed. Afterwards, when the reaction sets in, and headache is very troublesome, opium is of service. Nutritious fluid food should be administered at frequent intervals.

Puerperal Hæmorrhage, or Secondary Post-partum Hæmorrhage.

This term is applied to cases in which bleeding takes place some hours or days after labour. The bleeding may be slight or copious; there may be one attack only, or several recurrent attacks.

Causation.—(*a*) *Any condition interfering with efficient uterine contraction* may bring it on, *e.g.*, atonic condition of the uterus; the presence of clots, pieces of membrane and placenta in the uterine cavity.

(*b*) *Any condition leading to congestion of the uterus and separation of the coagula* may cause it, such as suddenly rising out of bed, exertion, straining at stool, stimulants, retroflexion and inversion of the uterus, fibroids.

(*c*) *Lacerations* of the cervix, vagina and perineum, and thrombosis of the vagina.

Treatment depends on the cause. In all cases absolute rest in bed should be enjoined. The urine should be drawn off, and the rectum unloaded by an enema if necessary. The uterine cavity should be explored, and clots and pieces of membranes and placenta carefully removed; it should then be washed out with a solution of carbolic acid. Any displacement of the uterus should be remedied. Full doses of ergot should be ordered thrice daily and a firm binder applied. If the above means fail, perchloride of iron should be used locally, as recommended in the preceding section.

XXXVI.—RETAINED PLACENTA.

Causation.—(*a*) **If traction is made on the cord,** and attempts are made to remove the placenta in this way, temporary retention often results.

(*b*) **Hour-glass contraction** of the uterus, *i.e.*, spasmodic contraction at the os internum, the uterus being relaxed above and below this point, may lead to retention of the placenta above the contraction.

(*c*) **Disease of the Decidua** may give rise to tough adhesions which retain the placenta *in utero.*

Result.—It is a common source of post-partum hæmorrhage, and if retained for some time may give rise to septic poisoning.

Treatment.—In some cases compression of the uterus serves to expel the placenta. When it cannot be expelled in this way, the hand should be passed into the uterus, and if any hourglass contraction exists, it should be gradually dilated by the fingers and the placenta removed. When adhesions exist, the placenta should be carefully separated from the uterine wall by the sides of the fingers, as little placenta as possible being left behind; great care, however, should be taken to avoid injuring the uterus. After removal of the placenta the uterus should be washed out with carbolic lotion.

XXXVII.—INVERSION OF THE UTERUS.

Definition.—Partial or complete turning of the uterus inside out.

Varieties—(*a*) **Partial.**—The fundus having a cup-like depression on its outer surface, with a corresponding projection on its inner surface. (*b*) **Complete.**—The uterus turned inside out as far as the cervix.

Causation.—It is due either to **pressure from above,** acting on the relaxed uterus, *e.g.*, undue manual pressure in expelling the placenta, pressure produced by straining, or to **traction acting on the inner surface,** as in drawing on the cord. In some cases it may be due to irregular and unequal contraction of the uterus. **Frequency.**—It is a very rare and dangerous complication.

Symptoms and Signs.—Uterine hæmorrhage, bearing down pains, and shock (fainting, weak pulse, etc.) are the chief symptoms. *Per vaginam* **in the complete form,** a globular mass is felt to which the placenta is often attached ; in the **incomplete form** a round swelling is felt protruding down to or through the os uteri, and *per hypogastrium,* instead of the rounded fundus uteri a cup-like depression may be felt in its place.

Diagnosis.—The passage of the uterine sound will distinguish it from a **polypus** ; in the latter the sound passes the whole length of the uterine cavity, whilst in inversion it either cannot be passed at all, or can only be passed a short distance.

Treatment.—Replace the uterus as quickly as possible by pressing the fundus upwards with the hand in the direction of the pelvic axis, applying counter-pressure in the hypogastrium ; to avoid the sacral promontory the pressure should be directed a little to one side. Chloroform should be given. Another method sometimes of use is to first re-invert the uterus near one of the Fallopian tubes. If the placenta is attached it is best to endeavour to reduce the uterus without detaching it, so as to avoid additional hæmorrhage ; if, however, this is impossible, the placenta must be removed before reduction.

XXXVIII.—RUPTURE OF THE UTERUS.

Anatomy.—Rupture may take place at any part of the uterus, but is most common at the junction of the cervix with the body, as this is the part which is most stretched and pressed upon during labour. Slight lacerations of the vaginal portion of the cervix are very common in labour, and are of little import, but rupture above this part is much less common, and is a very grave accident. The rupture may be **complete,** involving both uterus and peritoneum, or **incomplete,** involving uterus alone or peritoneum alone ; it is generally seated on the anterior or posterior surface, and is usually vertical in direction ; it may be merely a slight tear, but by extending upwards and downwards it may involve the body of the uterus and vagina, and become large enough to allow the passage of the fœtus. The borders of the rupture are ragged, and blood is generally effused into the peritoneum.

Causation.—Predisposing Causes—(*a*) *Any condition which produces undue compression or stretching of the uterus at the junction of the body and cervix* will predispose to rupture, *e.g.*, deformed pelvis, very large fœtal head, mal-presentations, etc.

(*b*) *Alteration of the uterine tissue*, such as is produced by the presence of fibroids, cancer, premature fatty degeneration of the muscular fibres, may favour its production. It is most common in multiparæ.

Exciting Causes.—Blows on the uterus, falls, injury by instruments, excessive contractions of the uterus, such as occur in contracted pelvis and after the use of ergot, may produce it.

Symptoms and Signs.—Rupture may be preceded by crampy pain in the lower part of the abdomen, but as a rule it occurs suddenly, and is accompanied by great pain in the abdomen, and there is often a feeling of something having given way. Blood flows from the vagina, and the uterine contractions cease. Symptoms of collapse (cold clammy skin, pallor, thready pulse, vomiting) soon follow. By examination *per vaginam* the presenting part will be felt to have receded from the os, owing to partial or complete escape of the child through the rupture; occasionally a loop of intestine descends into the vagina through the rent. In some cases the uterus may be made out to be empty and the rent can be felt, and it may be possible to trace the outlines of the child through the abdominal wall. When rupture is incomplete, the symptoms are not so evident, as the presenting part may not recede, and there are only the symptoms of hæmorrhage, pain and collapse present.

Prognosis.—As regards the mother it is very grave; recovery rarely occurs, death generally taking place from shock, hæmorrhage or peritonitis. The child is generally born dead.

Treatment.—Preventive.—In cases where pressure and stretching of the uterus occur, as in contracted pelvis, timely interference may prevent the possible occurrence of rupture. **After rupture has occurred,** if the fœtus remains entirely *in utero*, deliver as quickly as possible by turning or the forceps. If the head only has passed through the rent, it may be possible to seize the feet and extract the fœtus *per vaginam*, the placenta being afterwards carefully removed by the hand passed into the uterus. When the entire fœtus, or a greater part of it, passes into the peritoneal cavity, it is best to perform gastrotomy, and through the opening thus made extract the fœtus and placenta ; the rent in the uterus should be united as in the Cæsarian section, and the blood in the peritoneum carefully sponged out. Gastrotomy gives the mother a better chance than passage of the hand through the rent and attempts to extract the fœtus and placenta in this way. **General Treatment.**—The shock should be treated by stimulants, and if the mother survive, the subsequent peritonitis must be treated in the ordinary way with opium, etc.

Laceration of the Vaginal Portion of the Cervix.

Extent.—Slight tears are very common, but occasionally the entire cervix is involved. The tears are generally vertical, sometimes, however, they are transverse, and in rare cases an entire ring of cervical tissue may be detached.

Causation.—Lacerations occur most commonly in cases where the cervix is rigid and unyielding, as in old primiparæ ; they may be produced in obstetrical operations, and may result from pressure of the anterior lip of the cervix between the head and pubes.

Consequences.—Post-partum hæmorrhage, septicæmia, pelvic peritonitis may follow tears of the cervix.

Treatment.—If the rent is only slight and there is no hæmorrhage, cleanliness by means of antiseptic injections will suffice. When more extensive and accompanied by hæmorrhage, the bleeding should be arrested by cold or hot water injections, or by swabbing with perchloride of iron solution. If very extensive, sutures may be used.

Lacerations of the Vagina.

Extent.—They may be mere abrasions of the surface, or may be more extensive, and result in vesico-vaginal or recto-vaginal fistula.

Causation.—Pressure produced by the head, or injury by the forceps are the commonest causes.

Treatment.—Slight cases simply require cleanliness; if a fistula is produced it will require surgical treatment afterwards.

Lacerations of the Perineum.

Extent.—They may be very slight, or may extend up to the sphincter ani, or even through the sphincter into the rectum.

Treatment.—In very slight cases, rest in bed and cleanliness will suffice; if at all extensive, or if the rectum be involved, the wound ought to be united by sutures at once, the sutures making the entire circuit of the wound. The patient should be kept in bed with her knees tied, and the urine drawn off with the catheter every six or eight hours. The sutures should be removed in about seven days.

XXXIX.—THROMBUS OF THE VAGINA AND VULVA.

Definition.—Effusion of blood into the cellular tissue of the vulva and vagina during or immediately after labour.

The hæmorrhage may be arterial or venous. The effusion may occasionally extend along the vagina to the cellular tissue in the iliac fossa, or upwards beneath the peritoneum to the kidneys posteriorly. The result of the hæmorrhage is the formation of a tumour in the vagina or vulva, varying from the size of a hen's egg to that of the fœtal head.

Causation.—This condition depends on distension of the vessels consequent on pressure of the presenting part of the fœtus; it is also partly due to the straining efforts of the mother.

Symptoms and Signs.—A swelling appears at the vulva, over which the skin is blue and tense. Rupture of the swelling may take place and fatal hæmorrhage ensue. If the blood contained in the tumour be fluid, fluctuation may be felt; if coagulated, it presents a boggy feel. The tumour may obstruct labour, and by pressing on the rectum and neck of the bladder may cause obstruction of the bowel and retention of the urine.

Termination.—If of small size, absorption of the blood and recovery may take place. Recovery occasionally occurs after rupture. Death may result from hæmorrhage with or without rupture, or it may result from septicæmia owing to decomposition of the sac contents.

Treatment.—If it occurs during labour, the labour should be concluded as quickly as possible by application of the forceps; if, however, the tumour obstructs delivery, it should be incised and the clots turned out, the hæmorrhage being controlled by digital pressure and application of perchloride of iron solution. If rupture occurs after labour, the hæmorrhage should be controlled by the same means. After delivery, if the thrombus is small it should be left alone, as absorption may occur; if suppuration takes place, the abscess thus formed should be opened and treated antiseptically.

RUPTURE OF THE PELVIC ARTICULATIONS

Occasionally ensues from the use of the forceps in contracted pelvis. The symphysis pubis is the joint most often injured. It is generally accompanied by laceration of the soft tissues (bladder, rectum).

Treatment.—Rest in bed and application of a binder.

OBSTETRIC OPERATIONS.

XL.—INDUCTION OF PREMATURE LABOUR.

Objects of the Operation.—Delivery at full term often subjects the mother or the child, or both, to danger which may be avoided by inducing labour at an earlier stage of pregnancy. If it is desirable to obtain a viable child, the operation should not be performed earlier than the seventh month, as there is little chance of a child born before that date surviving. The operation may be indicated in the interest of the mother, or of the fœtus, or of both.

1. **It is Indicated for the sake of both Mother and Child** in some cases of pelvic contraction and tumours when delivery at full term would be injurious.]

2. **It is Indicated for the Child** in cases where the child has died in previous pregnancies at some particular time from placental or other disease. If labour is induced a little before the time at which death has usually occurred, a living child may be obtained. It is not easy to decide when to bring on the labour, but careful auscultation of the fœtal heart, the beat of which becomes tumultuous just before death, and other signs of commencing death (mentioned in a previous section) will guide us.

3. **It is Indicated for the Mother,** as a last resource, when all other means have failed and the mother's life is endangered, in cases of excessive vomiting, chorea, convulsions, great dyspnœa from pressure of the uterus on the diaphragm. also when uterine hæmorrhage, X

Methods of Inducing Labour :

1. **Rupture of the Membranes** by means of a catheter or sound. This is a certain method, but it is apt to be slow, because the fluid dilating wedge formed by the bag of membranes is lost. As the fœtus is exposed to the direct pressure of the uterus it is often still-born. The method is very useful in producing early abortion, but is not adapted for inducing premature labour unless combined with other methods.

2. **Artificial Dilatation of the Cervix** is slow in its effects, but combined with other methods it is very useful. Sea tangle tents are inserted into the cervix, and the dilatation is completed by Barnes's caoutchouc bags. These bags are fiddle-shaped, and have on one side a small socket into which a catheter can be inserted ; by means of the catheter they are pushed up into the cervix, and when *in situ* they are distended by a syringe.

3. **Vaginal Douches of Cold or Warm Water,** if used three or four times daily, will bring on labour in about three days.

X cardiac & pulmonary disease, albuminuria
abdominal tumours, ascites, hyperem

4. **Intra-uterine Injections** of tar-water by means of a catheter introduced between the membranes and uterine wall.

Both the vaginal and uterine injections, as methods for inducing labour, have been discarded owing to their liability to cause death from shock.

5. **Exhibition of Ergot** is dangerous to the child, because of the injurious pressure exerted on it by the contracted uterus; hence it ought not to be used.

6. **External Stimulation of the Uterus** by friction, galvanism, etc., is uncertain in its action and cannot be relied upon.

7. **Catheterization of the Uterus Combined with other Methods** is the usual and best method. A clean gum-elastic catheter is carefully inserted between the membranes and the uterus for about seven inches and left *in situ;* the membranes should not be ruptured. Labour generally comes on in a few hours, and may be concluded without further help, but if necessary it may be assisted by dilatation with Barnes's bags and puncture of the membranes.

XLI.—VERSION.

Definition.—By version (turning) is understood the conversion of a transverse presentation into one of the head or breech, or the substitution of one pole of the fœtus for the other.

Indications for the Operation.—The operation may be required for the mother alone, for the child alone, or for both. The following are the chief conditions in which it is required: transverse presentations, certain cases of deformed pelvis (with conjugate between $3\frac{1}{2}$ and $2\frac{3}{4}$ inches), various conditions endangering the life of the mother or child, such as prolapse of the cord, placenta prævia, accidental hæmorrhage.

Prognosis.—For the operation to be easily performed a certain degree of mobility of the child in the uterus must be present; this is only the case when the liquor amnii is present or has only recently escaped. When the uterus is tightly contracted on the fœtus there is great danger in trying to move it, and attempts at version may be followed by rupture of the uterus and shock, which may prove fatal. Hence the prognosis as regards the mother varies with the time at which the operation is undertaken, being more grave the later it is performed. The maternal mortality is about one in sixteen ; the mortality of the children is the same as in breech presentations (one in three).

Classification of Methods.

1. *External Version.*—In this, the change in position of the fœtus is effected, by both hands manipulating externally on the abdominal wall.

2. *Combined or Bi-polar Method.*—The change is effected by manipulation with one hand externally, two or more fingers of the other hand manipulating through the os uteri.

3. *Internal Version.*—The change is effected by means of the entire hand passed into the uterus. By any of these methods the head (*cephalic version*), or the feet (*podalic version*) may be made to present.

1. **External Version** can only be performed while the fœtus is very movable, *i.e.*, before or soon after rupture of the membranes ; hence it may be attempted when a transverse presentation is discovered before or shortly after the commencement of labour. It is not suitable in cases where rapid delivery is indicated, or where the liquor amnii has long run off.

Method.—The positions of the head and breech should be ascertained by abdominal and vaginal examination. The patient should lie on her back, whilst the operator with one hand pushes the head towards the brim, the breech being pushed in the opposite direction with the other hand. As the head would readily slip back to its old position, it should be retained over the brim till it is engaged, either by the hand or by means of pads placed at the breech and head.

2. **Combined or Bi-polar Method** (of Braxton-Hicks) is applicable to the same class of cases as **external version.** The presentation may be converted into a vertex or foot presentation. Before commencing, the exact positions of the head and breech should be ascertained.

(*a*) **Cephalic Version by the Bi-polar Method.**—One or two fingers of the left hand are passed through the cervix, and the shoulder is pushed gradually in the direction of the feet; at the same time the right hand is used externally and presses the head towards the brim. When in position over the brim, the head should be retained there by the right hand, while the left is withdrawn from the vagina, and presses the breech upwards if necessary.

(*b*) **Podalic Version by the Bi-polar Method.**—By this means a head or shoulder presentation is converted into a foot presentation. **If the head presents,** its exact position should be made out from the position of the fontanelles. Two or three fingers of the left hand are passed through the cervix, and if the head lies in the first or fourth position, it should be gradually moved on the tips of the fingers to the left, the breech being depressed by the right hand in an opposite direction; when the shoulder arrives at the os it should be pushed in the same direction as the head; as soon as a knee or foot comes in contact with the finger it should be seized and the membranes ruptured. If the head lies in the second or third position, it should be pushed to the right; when the exact position of the head cannot be made out, it should be pushed to the left, as it generally lies in the first position. **If the shoulder presents** it should be pushed in the direction of the head. The manipulations should be done in the intervals between the pains.

3. **Internal Version.**—(*a*) **Cephalic Version** is never done by this method, owing to the difficulty of seizing the head and retaining it in position.

(*b*) **Podalic Version** is easy by this method, if attempted before the liquor amnii has run off. The longer the time that elapses after rupture of the membranes, the greater the difficulty in performing the operation, as the uterus becomes tightly contracted on the fœtus, and prevents manipulation by the hand. Before turning, the bladder and rectum should be emptied, and chloroform given to do away with uterine contraction as much as possible. **Method.**—After the fingers, hand, and forearm have been well oiled on their dorsal aspect, the hand should be passed in the form of a cone through the vagina and os uteri along the axis of the pelvis ; when in the uterus the hand should be flattened out, and passed along the child's abdomen. All movements of the hand in the vagina and uterus should be performed in the intervals between the pains. Rupture of the membranes should be avoided, if possible, till the hand is well in the uterus ; they may then be ruptured, and a foot or knee seized and traction exerted on it between the pains ; in consequence of this traction the breech will descend, and ascent of the head should be helped by the external hand. As soon as the leg is brought through the os the labour may, if necessary, be finished by traction.

There are two questions of importance in turning, viz. : (*a*) *What part of the fœtus ought to be seized ?* (*b*) *Which hand ought the operator to use in the uterus ?*

(*a*) *What part of the fœtus ought to be seized ?* If the parts are not fully dilated a foot or knee should be seized, the other limb being left behind to form with the breech a better dilating wedge. If the cervix is well dilated both may be seized. If an arm presents it is best to seize (as advised by Dr. Galabin) the opposite foot, as the force applied to this limb will act with greater advantage in causing the arm to rise up out of the os.

(*b*) *Which hand ought the operator to use in the uterus ?* As a rule the left-hand should be used, partly because it passes more readily along the pelvic axis, and partly also because the abdomen of the child is generally directed posteriorly, and hence the palm of the hand passing along the child's abdomen will be more ready to seize the knee or foot. For the same reason, if the child's abdomen be directed to the front the right-hand should be used.

Internal Version in Difficult Cases.—In cases where the liquor amnii has long run off, and the uterus is tightly contracted on the fœtus, and the shoulder jammed down into the pelvis, version becomes extremely difficult and sometimes impossible. This is owing to the difficulty of introducing the hand and of rotating the fœtus when the hand is introduced ; the cramped position of the hand when in the uterus also increases the difficulty. In these cases there is danger of rupture of the uterus occurring. **Method.**—Chloroform should be given to its full extent, and the hand gradually insinuated by the presenting part and passed along the child's abdomen in the intervals of the pains. The foot or knee opposite the presenting part should be seized, and version of the child may be assisted by pushing up the head by means of the external hand; or a tape may be passed round the limb that has been brought down, so as to retain it, whilst the hand is used to push up the presenting part from the os. If version fail, decapitation or evisceration will be necessary.

XLII.—THE FORCEPS.

Description of the Instruments.—There are two varieties of forceps, the short and the long, but there are endless modifications of each variety. **Essential Features of the Short Forceps.**—The blades are attached to the handles without the intervention of any shank, and only present one curve (cranial) by means of which they can be adapted to the surface of the head. The short forceps is only of use when the head is low down in the pelvis, and occasionally in the rotation of occipito-posterior positions, when the use of the long forceps might be injurious. The short forceps is very rarely used now, as its place, in nearly all cases, can be taken by the long forceps. **Essential Features of the Long Forceps.**—The blades are attached to the handles by means of a shank; in addition to the cranial curve they present a pelvic curve by means of which the blades, when inserted high up in the pelvis, can lie in the axis of the cavity without injuriously pressing on the perineum. Owing to the pelvic curvature, each blade will only pass with the concavity of the curve directed anteriorly, hence the division into upper and lower blades, one blade being passed so as to occupy the left extremity of the transverse diameter of the pelvis, the other to occupy the right extremity.

The Use of the Forceps is Indicated

(1) *In certain cases where delivery cannot be effected by the ordinary uterine pains, e.g.*, certain cases of narrowing of the passages from pelvic deformities (with conjugate of 4 to 3¼ inches) or tumours, rigid perineum, uterine inertia, large fœtal head, etc.

(2) *In certain cases where the life of the mother or child is in danger, e.g.*, in eclampsia, exhaustion, prolapse of the cord, some cases of placenta prævia.

Generally speaking, if the head is engaged in the pelvis and there is no advance for some time, the forceps should be applied; in cases where the head is freely movable above the brim, version is preferable to the forceps.

Difficulties and Dangers of the Operation.—When used for the head low down (*low operation*) in the pelvis, the operation is easy and safe; when the head is situated at or above the brim (*high operation*), the operation becomes more difficult and serious. The dangers that occasionally follow forceps operations are, as a rule, not so much due to the action of the forceps as to the fact that interference has been put off too long, and hence the maternal parts have suffered from pressure. Lacerations of the uterus, vagina or perineum, thrombosis of the vagina and vulva, may, however, sometimes result from the use of the forceps, and, as secondary consequences, pelvic cellulitis and peritonitis may occur.

Action of the Forceps.

(*a*) **As a Tractor.**—*Direct traction* in the axis of the pelvis is the chief use of the forceps.

(*b*) **As a Compressor.**—By the close apposition of the handles the head may undergo a certain amount of compression; this action, however, is very slight, as it is doubtful if the bulk of the already moulded head can undergo much compression without injuring the child, and, moreover, compression exerted in one diameter of the head will cause an increase in the size of the opposite diameter.

(*c*) **As a Lever.**—When the handles are not in close apposition, the blades may act as two levers of the *first kind* by moving on one another at the lock; again, when the handles are in close apposition, by a side to side movement of the forceps, it may act as a lever of the *second kind*. This action only slightly assists delivery.

(*d*) **Dynamical Action.**—The forceps, like any foreign body in the uterus, will excite it to renewed contraction; this is called its dynamical action.

Method.—Preliminary Preparations.—The urine should be drawn off by the catheter, and the rectum emptied by an enema. The membranes should be ruptured and the cervix well dilated. By examination of the sutures the position of the head should be made out. In the *high operation* chloroform should be given, but in the *low operation* it may be dispensed with. The patient should lie on her left side, with her body at right angles to the edge of the bed, and having her buttocks well over the side, and her thighs drawn up towards the abdomen. Before use, the blades must be warmed and oiled.

Introduction of the Blades.—The lower blade is introduced first. The handle is grasped like a pen, and is at first held vertically upwards; two or more fingers of the left hand are introduced into the vagina, and the blade is passed along their palmar surface backward in the axis of the outlet. The fingers in the vagina, by being interposed between the cervix and the head, are able to guide the blade into position on the head; meanwhile the direction of the blade is gradually changed from the axis of the outlet to that of the inlet, and the handle is gradually depressed till it becomes horizontal. When in position on the head, the handle is carried back to the perineum and held there by an assistant. The upper blade is next introduced, the handle being held vertically downwards, and it is gradually raised as the blade passes along the pelvic axis to the side of the head; the two fingers of the left hand serve to guide it into position. *The movements of the blades during introduction should be performed in the intervals of the pains.* **Locking.**—The blades are now to be locked; if they do not fit accurately together they should be withdrawn and again inserted. During locking, care should be taken not to injure the soft parts about the vulva. **Traction.**—If the head is high up, traction must be applied in the axis of the brim, *i.e.*, *downwards and backwards ;* traction should only be performed *during the pains*, and, if the pains are absent, at intervals of two or three minutes ; the uterus should be stimulated to contraction by external friction. *As regards rotation of the head*, it occurs as a rule independently of the forceps, and it is best not to attempt it by the forceps. As the head reaches the lower part of the pelvis the traction should at first be applied directly downwards and afterwards forwards, till finally, as the head is about to emerge, the handles should be raised towards the mother's abdomen. When the head reaches the perineum, and there is some danger of rupture occurring, the forceps may be removed and the case left to nature.

It will be seen from the above, that the blades of the forceps are passed at each extremity of the transverse diameter of the pelvis without any regard to the position of the head. This is the best method, for if passed in any other way they generally slip into the same position, and the marks on the head are seen, one over the frontal bone, and the other over the occiput on the opposite side of the head. In some cases, when the patient cannot be brought up to the side of the bed, and hence the upper handle cannot be depressed, the blade should be passed along the sacral curve from the front and then gradually brought round into the transverse diameter. The lower blade is passed in the ordinary way.

XLIII.—CRANIOTOMY AND CEPHALOTRIPSY.

Craniotomy involves perforation of the skull, evacuation of the cranial contents, and breaking up and extraction of the cranial bones if necessary.

Description of Instruments.—(*a*) **The Perforator** possesses a pair of pointed blades, which are used for perforating the skull. The external edges of the blades present a small cutting edge near the base, and beyond this a projecting shoulder, which prevents the instrument from running too far into the cranium. The blades are separated by approximating the handles. (*b*) **The Crotchet** is a curved or straight sharp hook, which can be fixed on some part of the fœtus. It is rarely used now for extraction, as it is liable to slip and injure the soft parts of the mother. (*c*) **The Craniotomy Forceps** consists of two blades, which are generally serrated or grooved in order to give them a better hold; the blades are inserted like the forceps, one being placed outside the skull, the other inside; they are locked by a button, or other means. This instrument is chiefly used for traction, but it may be of service in breaking up and extracting portions of the skull. A very useful form of craniotomy forceps is the **cranioclast** of Simpson. (*d*) **The Cephalotribe** possesses two strong blades, which are applied outside the skull after perforation. The blades can be approximated by means of a screw attached to the handles, so as *to crush* the cranial bones at the base of the skull. The instrument possesses a slight pelvic curve, hence it is inserted in the same way as the forceps, and may be used *to extract* after crushing. The cephalotribe therefore acts as a **crusher** and a **tractor.** The operation of crushing and extraction by the cephalotribe is termed **cephalotripsy.** (*e*) **A wire écraseur** and **a small chain saw** are occasionally used to remove portions of the cranial bones.

Indications for Craniotomy—

1. **Considerable Deformity of the Pelvis.**—By craniotomy a child can be extracted through a pelvis with a conjugate of 3—1½ inches, by cephalotripsy of 3—2½ inches. Cephalotripsy is preferable to craniotomy when the obstruction is not very great, because by it the base of the skull can be crushed, and the scalp protects the mother's parts from the exposed cranial bones. In craniotomy it is often necessary to remove portions of the bones, which may, during extraction, injure the mother.

2. **In some cases of contraction of the soft parts** it may be required, *e.g.*, in rigidity of the cervix occasionally, in cicatricial contractions of the vagina, etc.

3. **Large size of the Fœtal Head,** *e.g.*, hydrocephalus.

4. **When the Child is dead** it is often best to perforate in order to expedite delivery.

The Operation.—The bladder and rectum should first be emptied. (*a*) **Perforation.**—The points of the perforator are passed up to the head guarded by two or three fingers of the left hand; they are then applied over one of the cranial bones (not over a suture), and with a boring movement made to pass through the scalp and bone up to the 'rests.' By closing the handles a cut is then made through the bone. The instrument is now turned, and a similar cut is made at right angles to the first; the instrument is then passed into the brain and moved freely about, after which it is carefully withdrawn. The cranial bones then collapse, as the brain matter escapes from the opening; and, if perforation has been performed while the forceps is in position, it may be possible now to extract the head by the forceps. (*b*) **Extraction by the Craniotomy Forceps.**—One blade is applied outside the scalp, and the other inside the cranium, and traction is exerted during the pains. It may be necessary, in order to lessen the bulk of the head, to break up and tear away some of the cranial bones by applying the outer blade between the scalp and the bone, and the other blade internally; in extracting the pieces of bone the mother's parts should be protected by the fingers, and the scalp preserved as much as possible. The forceps are then reapplied, the outer blade being placed over the face so as to draw it down first. After the head is delivered the body soon follows, either naturally, or it may be aided by traction on the head, or by the finger or blunt-hook in the axilla. In some cases, when difficulty arises in expulsion of the trunk, it may be necessary to perforate the thorax and extract it with the craniotomy forceps.

(*c*) **Cephalotripsy.**—After perforating, the blades of the cephalotribe are introduced in the same way as the forceps. They should be deeply inserted, so as to reach the base of the skull. When in position, the blades are screwed together and the head crushed. Any protruding spiculæ of bone should now be removed, and extraction performed during the pains. In some cases, when the head will not readily pass, the instrument may be taken off, and after allowing the crushed head to mould itself to the passages, the blades may be again applied.

XLIV.—EMBRYOTOMY.

Under this heading two measures are included, viz.: **Decapitation** and **Evisceration.**

The Operation is Indicated in cases 1, where delivery of the body is prevented by pelvic deformity, & 2, by malformations and visceral tumours of the fœtus; 3 also in neglected shoulder presentations when turning cannot be performed & 4 Monstrosities. +

1. **Decapitation.**—There are several methods of dividing the neck. Indications = 3 & 5 (when possible) & in 6.
   - (*a*) *By Ramsbotham's hook*, the concave edge of which is sharp and cutting. The hook is passed round the neck, and, by means of a sawing movement, combined with traction, the neck is cut through. Its action must be guided by the left hand.
   - (*b*) *Division of the neck by a pair of blunt-pointed scissors.*
   - (*c*) *Division of the neck by a piece of whipcord.*—The cord is passed over the neck by means of a flexible catheter, and is worked in a saw-like manner round the neck. To protect the soft parts of the mother the ends of the cord should be passed and worked through a speculum.
   - (*c*) *Division of the neck by a wire écraseur*, which is drawn into position round the neck by an instrument resembling that used for plugging the posterior nares.

After decapitation the body is easily delivered * by traction on the arm, and the head is afterwards perforated, and delivered by the craniotomy forceps.

2. **Evisceration** is only indicated in cases when it is impossible to reach the neck and decapitate. **Method.**—The chest is perforated, and the contents of the chest and abdomen are broken up by the perforator and removed through the opening.

* Head having been already extracted

5 Transverse presentations c̄ pelvic deform.y

The spine is then divided internally by the scissors, and the breech is drawn down by traction with the blunt hook externally, or by the crotchet applied internally to the lower part of the spine.

XLV.—CÆSARIAN SECTION.

Definition.— Division of the abdominal and uterine walls, and extraction of the child through the openings thus made, when delivery by the natural passages is impossible.

The Operation is Indicated as a last resource in cases of extreme pelvic contraction. If the pelvis measures 1½ *inches or less* in the conjugate, the passage of a mutilated child is generally impossible, and Cæsarian section becomes necessary. These cases of great contraction may be produced by osteo-malacia, rickets, uterine, pelvic and other tumours encroaching on the pelvic space. When the mother dies in labour it is indicated to save the life of the child.

Prognosis.—As regards the mother it is extremely bad. The mortality is about 60—70 per cent., due in a great measure to the fact that it is rarely performed till the mother is moribund. As regards the child, if it is alive before the operation, the risks are no greater than in ordinary labour.

Time and Preparation for the Operation.—It should be performed during the first stage of labour, before the membranes are ruptured, so that the lochia may have a free escape through the dilated cervix. If the condition is known before labour the patient should be prepared by a course of good food, tonics, etc. The operation should be performed under the carbolic spray, and, if possible, not in a hospital. Ether should be used as an anæsthetic. The bladder should be catheterized before the operation.

The Operation.—An incision is made along the linea alba from an inch above the umbilicus to three inches below it; when the peritoneum is reached it is laid open over the whole length of the incision. The uterus is then pushed by an assistant against the opening, and an incision four inches long is made into it till the membranes are reached, carefully avoiding the placenta if possible; the uterine wound is now hooked up against the abdominal wound, so as to prevent escape of blood and liquor amnii into the peritoneum. The child is seized, and may be brought out head and shoulders first or feet first. After the child is extracted the placenta and clots should be removed. The uterine wound is then closed by interrupted carbolized silk ligatures, and the peritoneal cavity carefully sponged out with carbolic lotion. The abdominal wound is closed from above downwards with wire sutures, an inch apart, which are passed through the entire thickness of the abdominal wall, including the peritoneum. Antiseptic dressings and a flannel binder are finally applied.

Subsequent Treatment.—The patient should be placed in a quiet and well-ventilated warm room. The catheter should be used every 6—8 hours. The diet should be fluid, and if the pulse fail stimulants must be given. If sickness occur it should be relieved by ice. Opium must be given if peritonitis sets in. The bowels should not be relieved for five days. The sutures may be removed in about five or six days.

Dangers and Causes of Death in Cæsarian Section.

Hæmorrhage.—Excessive hæmorrhage may take place from the vessels and sinuses at the placental site. The placenta should be avoided in the incision, and if the hæmorrhage be excessive, the placenta should be quickly extracted, and the hæmorrhage checked by compression of the uterus or by swabbing the bleeding surface with perchloride of iron solution.

Shock following on the operation.

Peritonitis—depending on escape of liquor amnii, blood and lochia into the peritoneal cavity.

Septicæmia—arising from septic absorption by the uterine veins.

Gastro-Elytrotomy—Laparo-Elytrotomy.

In this operation the risks of opening the peritoneum are avoided. **Operation.**—An incision is made from the pubes to the anterior superior iliac spine, and the peritoneum is lifted up from the iliac fossa, till the junction of the cervix and vagina is reached. An opening is then made into the vagina, and the os is dilated; the child is then extracted through the vaginal wound and out through the abdominal opening.

Symphysiotomy.

Division of the symphysis pubis was formerly practised, with a view to widening the pelvic canal, and allowing the passage of the fœtus in cases where Cæsarian section would otherwise have been necessary. The conjugate diameter is very little increased by division of the symphysis, hence the operation has fallen into disuse.

XLVI.—ANÆSTHESIA IN LABOUR.

During the **first stage of labour** anæsthetics should be avoided, as they tend to weaken uterine contractions; in cases, however, where the cervix is rigid and great pain occurs during its dilatation, chloral is often of service. Chloral, like chloroform, lessens the pain, but unlike chloroform, it does not enfeeble the action of the uterus.

In the **second stage** chloroform is of great use in lessening the suffering, and it should be given *during the pains*, not, however, to complete anæsthesia. During the intervals it should not be administered. Chloroform predisposes to post-partum hæmorrhage, hence during and after the third stage it is necessary to guard against it by securing efficient contraction of the uterus. During the **third stage** of labour chloroform should not be given.

In obstetric operations, when it is decided to give chloroform, complete insensibility and relaxation should be produced by administering it to its full extent.

XLVII.—TRANSFUSION OF BLOOD.

Indications.—Transfusion is indicated in cases of extreme collapse following post or ante-partum hæmorrhage.

Its object is chiefly to stimulate the heart of the patient to action by means of the blood transfused, and also to replace, in a very slight degree, the blood lost.

Difficulty and Dangers.—The great difficulty is the tendency which the blood has to coagulate, and the possible danger is the injection of fibrinous emboli and air into the vein. Pyæmia has occasionally followed.

Methods.

A. **Mediate transfusion** from arm to arm (Aveling's method). This is performed by means of a small valveless Higginson's syringe having a silver canula at either end. One canula is inserted into the vein of the person supplying the blood, the other into the patient's vein. The syringe contains about four ounces, and is filled with warm water before injection in order to avoid entrance of air into the veins. This is a good method, though it is rather difficult to manage.

B. **Injection of Defibrinated Blood.**—Eight to ten ounces of blood are taken and stirred with a glass rod; the coagulated fibrin is then got rid of by straining the blood through muslin. The defibrinated blood is injected at a temperature of 100°, with a small ordinary syringe or a small Higginson's syringe. This method is easy of performance, and the risk of injecting fibrinous emboli is done away with, whilst the essential elements of the blood—the corpuscles—are retained.

C. Injection of blood in which **coagulation is prevented** by the addition of sodium phosphate. The objection to this method is that it increases the amount of fluid to be injected.

Whichever method is adopted, the injection should be performed slowly, and the effect on the pulse carefully watched. The injection of four to six ounces is generally sufficient to rouse the patient and to cause a return of the pulse and a rise of temperature. If the syncope recur, it may be necessary to repeat the operation. The injection should be immediately discontinued, if the respiration become embarrassed from admission of air into the vein or from too rapid performance of the operation.

Injection of Milk into the vein has been recommended and used for the same object as transfusion of blood.

THE PUERPERAL STATE AND ITS DISEASES.

XLVIII.—THE PUERPERAL STATE.

Condition of the Patient after Labour.—A Slight Chill generally follows labour, but quickly passes off. **A Slight Rise of Temperature** (of one or two degrees) is common, and depends on involution of the uterus and commencing lactation; it generally falls when lactation is fully established. A temporary rise of temperature may occur from excitement or constipation; a **continued high temperature** above 100° generally points to some complication. **The Frequency of the Pulse,** as a rule, lessens after labour, but any trivial cause may increase its frequency; if continuously above normal some complication may be suspected. **The Skin** is moist and active. **The Urine** may be retained owing to swelling about the urethra or to temporary paralysis of the bladder. **The Bowels** are generally constipated and the **appetite** indifferent. The body loses about 9—10 lb. in **weight** during the week following labour. **Lactation** generally commences in about 48 hours, and is accompanied by fulness and tenderness of the breasts, and by some general disturbance (as shown by the rise of temperature and pulse), which disappears in a day or two. This constitutional disturbance is termed **Milk Fever.**

Changes in the Uterus after Labour.—Involution of the uterus occurs, the uterus undergoing a rapid diminution in size and weight, owing to fatty degeneration of its muscular fibres. During the first eight or ten days it can be felt above the pubes, but after the second week it cannot be made out. Immediately after delivery the uterus weighs about 1½ lb., and measures about 7½ inches long; in a fortnight after labour its weight is ¾ lb., and length 5 inches; by the end of the second month involution is complete, and the uterus has *nearly* regained its normal size and weight; the uterus, however, always remains a little larger than it is in the virgin. During involution all the muscular tissue is removed and replaced by newly developed muscle. **The Cervix** is soft and patulous ; the os externum is torn, and the os internum will admit the finger up to the end of the first week. Like the body, the cervix undergoes involution. **Subinvolution** is the chronic state of enlargement of the uterus that ensues, when the proper course of involution is interfered with by the patient getting about too early after labour, and other causes.

Changes in the Mucous Membrane of the Uterus.—At first the open mouths of the sinuses are seen on the placental site, and the internal surface is covered by the shreddy remains of the decidua. A part of the decidua is cast off in the **lochia**, but a part remains behind, and by proliferation of the glandular epithelium and interglandular connective tissue a new mucous membrane is formed.

Closure of the Uterine Sinuses.—At first they are closed by coagula, which afterwards become organized into connective tissue. Shrinking of this tissue then takes place, and the vessels gradually disappear.

The Vagina is smooth and dilated for some days. It quickly undergoes involution, but always remains wider and less rugose than in nulliparæ.

The Vulva is lax and swollen for a few days.

The After Pains are irregular painful contractions of the uterus, which take place during the first four days after labour. They generally depend on the presence of coagula in the uterus, and are relieved by their expulsion. They are most common in multiparæ, or when there has been uterine inertia from any cause. When the uterus contracts firmly after birth, as in primiparæ, they rarely occur.

The Lochia are the discharges from the uterus which persist for about a month after delivery. For the *first four days* they are red (**Lochia rubra** or **cruenta**), and consist of epithelium, decidual débris, blood corpuscles, and often contain blood clots. From the *fifth to the ninth day* they are greenish and thin (**Lochia serosa**, or '**green waters**'), and contain a few blood and pus corpuscles and débris. *After the ninth day* they become muco-purulent (**Lochia alba**), and gradually change to the normal transparent mucous discharge. The lochi may vary in *character* and quantity ; thus, after laceration of the cervix, or premature exertion, they may remain red and very copious for a longer time than usual ; again, by decomposition of clots, they may become fœtid, and occasionally give rise to septicæmia. They may be absent for a day or two without ill effect, and are often suppressed in the different puerperal diseases.

The Signs of Recent Delivery are sometimes important from a medico-legal point of view. The signs are only of service during the first eight or ten days following labour. They are as follows : The large tender breasts, the dark areola round the nipple, the expression of milk and colostrum from the nipples, the flaccid abdominal walls marked with lineæ albicantes, the enlarged uterus felt as a round hard mass above the pubes during the first week, the increased length of the uterine cavity as measured by the sound, the cervix patulous, the os externum fissured, the os internum admitting the tip of the finger till the end of the first week, the vagina lax and dilated, the fourchette torn, the lochia red during the first four days, and afterwards changing in character as mentioned above.

XLIX.—MANAGEMENT OF CHILDBED.

The patient should be kept quiet and all excitement avoided. The diet should be easily digestible (beef tea, milk, eggs, fish, chicken, etc.) ; after three or four days the ordinary diet may be resumed. Stimulants should not be given unless specially indicated. On the second or third day the bowels should be relieved by enema saponis or castor oil. The external parts should be washed, and the vagina syringed with weak Condy's fluid or carbolic lotion daily, especially if the lochia become offensive. The patient should be visited within twelve hours after labour and every day during the first week, and the pulse, temperature, and condition of the bladder noted. If **retention of urine** occur, hot fomentations should be applied to the hypogastrium and the catheter passed if necessary. When the **after-pains** are severe and disturb the patient's rest, 20 minims of laudanum may be given. The patient should keep her bed for nine or ten days, after which she may sit up, but she ought not to resume her ordinary avocation for at least three weeks. Tonics and change of air are often serviceable during convalescence.

L.—CONDITION AND CARE OF THE INFANT AFTER BIRTH.

Establishment of Respiration.—As a rule, immediately after birth the child cries aloud—a sign that respiration has begun. With the commencement of respiration certain changes (mentioned in a previous section) follow in the vascular system, consequent on the blood passing to the lungs.

Cause of the First Respiration.—It is partly reflex, depending on the application of cold to the skin, and partly due to direct stimulation of the respiratory centre by the circulation of venous blood through it.

Asphyxia Neonatorum.—Occasionally the child is born apparently dead (in a state of asphyxia), owing to non-oxygenation of its blood. **Causation.**—*Any condition which interrupts the placental circulation* may produce it, *e.g.*, separation of the placenta before birth, tonic contraction of the uterus (such as is produced by ergot or pelvic obstruction) blocking the circulation in the uterine sinuses, compression or torsion of the umbilical cord; again, it may arise from compression of the head in cases of contracted pelvis. **Symptoms.**—*In the first stage* of Asphyxia —**Asphyxia livida**—the face is livid and swollen, the child gasps slightly, the heart's action is slow and feeble; *in the second stage* the child becomes pale—**Asphyxia pallida**—the limbs flaccid, the surface cold, and the heart's action scarcely perceptible. The second stage is the most dangerous. **Treatment.**—The cord should be tied immediately. The mucus should be cleared out of the mouth by the finger, and the mucus may be sucked out of the air passages by a catheter passed down into the trachea. Various kinds of stimuli should be resorted to in order to induce respiratory movements, such as sharply flicking the chest with a wet towel, application of heat and cold alternately to the skin by dipping the child first into hot and then into cold water. If the above means fail, **Artificial Respiration** must be performed; the child is placed on its back with its head and shoulders elevated; its elbows are next raised above the head in order to dilate the chest; they are then depressed against the chest wall (the ribs being compressed at the same time) so as to empty the chest; this movement is performed every ten seconds. **Another Method.**—A catheter is guided into the trachea past the epiglottis, and the lungs are inflated through it; after being inflated, the chest is compressed by the hands, and the air expelled. As long as the heart-beats are perceptible there is hope for recovery, and artificial respiration should be persevered with, till the natural respiratory movements commence, or till the heart has ceased acting.

Meconium.—During the first few days after birth, and often during birth if the breech presents, the meconium is discharged from the rectum. **Characters.**—The meconium is a black fluid consisting of bile mixed with intestinal mucus.

The Vernix Caseosa is the greasy material, consisting of epithelium and sebaceous secretion, which covers the skin of the child at birth.

An abundance of urine of low specific gravity is secreted immediately after birth.

Exfoliation of the Epithelium, accompanied with congestion of the skin, commences about the third day and lasts about a week.

The Breasts of the Infant often swell and yield a milky fluid.

The Child loses weight during the first three or four days after birth, but quickly regains it.

Care of the Infant.—After birth the child should be washed with soap and warm water, and the vernix caseosa should be softened by olive oil and removed. Charred linen, covered with a pad of lint, is used for dressing the cord. The cord dries up and separates in about a week. The abdomen should be supported with a flannel bandage. The child should be warmly and lightly clothed, and should be washed all over once daily.

LI.—LACTATION.

As soon as the mother has rested the child should be put to the breast so as to favour uterine contraction. Till the secretion is fully established the child should take the breast once or twice daily; after the third day, when lactation is well established, the child should be applied regularly every two or three hours. The intervals between the times of suckling should be gradually lengthened, especially at night, so as to give the mother time for sleep. After the fifth month one artificial meal of bread-sop and milk, or chicken broth with bread-crumbs in it, should be given daily, and in a week or two another meal may be added; but the child should not be completely weaned till six or seven teeth have appeared.

The mother ought to suckle the child, unless disqualified by the following conditions:—great debility, lack of milk, syphilis, phthisis, or sore nipples; in such cases a wet-nurse must be chosen, or artificial feeding resorted to.

Selection of a Wet-Nurse.—She should be strong and healthy, and devoid of all marks of syphilis and struma. Her breasts should be pyriform and elastic, and the nipples well formed and free from cracks. The milk should flow easily from the breasts, and not be too blue in colour (watery). The nurse's child should be plump and healthy, and show no sign of disease. The nurse's age should be between twenty and thirty-five, and her child near the same age as the child to be suckled. The diet of the nurse should be plain, nutritious and abundant; rich foods are to be avoided. She should take gentle exercise in the open air daily.

Milk consists of fat globules surrounded by albuminous envelopes, and suspended in a fluid containing lactose and salts. The fat globules are derived from the cells lining the glandular alveoli of the breasts, the protoplasm of which undergoes fatty transformation. The cells eventually break down and discharge their fatty contents. For a short time after birth the milk contains large granular corpuscles—**Colostrum Corpuscles**—which render the milk first passed slightly laxative.

Chemically, milk consists of Fat (butter); Proteids (casein and albumen); Lactose (milk sugar); Salts (calcium phosphate, etc.), and water. Its reaction is alkaline, and specific gravity 1030.

Artificial feeding should be resorted to only when a wet-nurse cannot be obtained. Children thus fed are apt to be puny and to suffer from digestive disorders and teething. Ass's and goat's milk approximate more closely to human milk than cow's milk, and may be used if it is possible to obtain them; as a rule, however, **cow's milk** has to be employed, and it should be obtained fresh and good. Cow's milk differs from human milk in containing **less sugar and water**, but **more casein and butter**; hence, before using, it must be diluted, and sugar added. During the first two months it should be given in the proportion of two parts of milk to one part of water, and should be warmed to about 96°, and sweetened a little; after the third month pure milk, warmed and sweetened, may be given. One great objection to cow's milk is due to the casein forming large irritating coagula in the stomach; this tendency is lessened by adding a tablespoonful of limewater to each bottle of milk. If good cow's milk cannot be obtained, condensed milk should be used.

The feeding-bottle should be well scalded after being used, and the teat and tube kept perfectly clean. The child should be fed at regular intervals, and milk ought to be the only food during the first six months; after that time additional meals of bread-sop, broth and bread-crumbs, etc., may be given, but milk should form the chief article of diet till the end of the first year. During the first three months purely starchy food, such as corn-flour, and arrowroot, etc., must be avoided owing to the feeble action of the child's saliva on starch. Between the times of feeding, the child, if healthy, sleeps; restlessness generally points to some defect in the milk or lactation.

LII.—DISORDERS OF LACTATION AND OF THE BREASTS.

To get rid of the Milk, in cases where the mother does not nurse, the breasts should be smeared with a mixture of Extract. Bellad. ʒſs, and Glycerine ʒj; and 20 grains of Magnes. Sulphat., with 5 grains of Potass. Iodid., should be given internally three times a day.

Deficiency of Milk generally depends on mal-nutrition. It is best remedied by giving a nutritious diet, and by applying the child to the breast less frequently and feeding it partly on cow's milk.

Sore Nipples.—Aphthous ulcers, excoriations and fissures may affect the nipples, and are generally seated at its base. They occasionally (by spread of the inflammation) lead to the formation of a mammary abscess. **Treatment.**—The nipples should be washed after suckling, and, in simple excoriations, Lotio Plumbi or a solution of Tannic acid applied, or the surface protected by flexible collodion. Any lotion that is used should be washed off before putting the child to the breast. In aphthous ulcers the use of a lotion of Boracic acid or Sulphurous acid is of service. Fissures, if rebellious to the above means, are best treated by application of solid lunar caustic. To protect the parts the child may suck through a nipple-shield.

Depressed Nipples are generally owing to pressure of the stays. **Treatment.**—Attempts should be made to elongate them by pulling on them with the fingers, or by drawing them out by suction through a breast-pump; if incurable, the child should suck through a nipple-shield.

Mammary Inflammation and Abscess.—**Causation.**—The inflammation may arise from the irritation of a sore nipple, or from exposure to cold, or from a blow. **Pathology.**—The inflammation involves the glandular and inter-glandular tissues, and may affect the connective tissue beneath the gland. It may **terminate** in resolution, or in suppuration with the formation of one or more abscesses, which open successively, and may lead to the formation of troublesome chronic fistulæ. **Symptoms.**—Tenderness, swelling, and induration exist at the seat of inflammation. The temperature is raised and the frequency of the pulse increased. When the inflammation involves the tissues beneath the gland, the pain is deep and dull, and the gland is lifted forward, but there is no fixed tender point. Suppuration is generally ushered in with rigors, and the abscess, when formed, generally rises to the surface (unless seated beneath the gland), and the skin becomes red and tense, and eventually the abscess bursts. The suppurating fistulæ, which sometimes remain, may lead to great exhaustion. **Treatment.**—The child should be taken away from the breast. *Resolution* of the inflammation should be favoured by giving quinine and salines. The breast should be supported by a bandage, and the pain treated by the local application of extract of belladonna and glycerine, or by exhibition of opiates internally. If *suppuration* takes place, the abscess must be opened as soon as possible under the carbolic spray, and dressed antiseptically. If extensive fistulæ result, the breast should be strapped, and in some cases it will be necessary to lay the sinuses open and apply some stimulating lotion.

Galactorrhœa.—Excessive formation and dribbling away of watery milk occasionally occur, and may prove exhausting. **Treatment.**—Lactation should be suspended, and the breasts compressed by strapping. Iodide of potassium should be exhibited internally, and abundant nutritious food given.

LIII.—PUERPERAL FEVER.

Definition.—A contagious fever identical with ordinary septicæmia, and depending generally on absorption of septic matter from the parturient canal.

Causation and Pathology.—The septic matter may arise in the patient (*autogenetic*), or be brought to the patient from without (*heterogenetic*).

1. **Autogenetic Sources.**—Decomposition of coagula and pieces of placenta or membranes within the uterus or vagina, decomposition of the lochia and sloughing of the maternal soft parts may produce the disease.

2. **Heterogenetic Sources.**

(*a*) The poison of puerperal fever may be carried from one patient to another.

(*b*) Septic matter may be carried from the post-mortem or dissecting room, and give rise to puerperal fever.

(*c*) The poisons of erysipelas and pyæmia may produce it.

(*d*) The poison of scarlet-fever may be carried to a puerperal woman, and give rise either to a virulent form of the same disease or to puerperal fever.

The poison in these cases may be carried by the hands of the medical man or nurse, by dirty sponges, etc., or by the atmosphere.

The Nature of the Septic Poison.—In cases of puerperal fever bacteria have been found in the decomposing products in the uterus, in the inflamed tissues around the uterus, in the lymphatics and various organs, and in the secondary inflammatory products. The universal presence of bacteria, and experiments on animals with septic fluids, lead us to think that the bacteria play some important part in the production of the disease; but whether they are the essential septic matter, or serve merely to carry it or produce it, is not known.

The Absorption of the Septic Matter takes place through the open vessels and lymphatics at the placental site, or by open wounds of the cervix and vagina. Possibly, in some cases, the septic material is absorbed by the intact vaginal surface, as in those cases where the disease begins before the commencement of labour.

Lesions which may be Produced by Absorption of the Poison.

A. Local Lesions.

(*a*) **Inflammation of the Mucous Membrane of the Uterus and Vagina,** the mucous membrane and lacerations becoming covered with yellowish diphtheritic patches.

(*b*) **Metritis.**—The uterus may be simply infiltrated with serum, or pus formation may take place.

(*c*) **Inflammation of the Pelvic Cellular Tissue,** which may spread to the iliac fossæ, and result in serous infiltration and sometimes in pus formation and abscess.

(*d*) **Pelvic Peritonitis,** involving Douglas's pouch and the broad ligament, and resulting in the exudation of fibrin, or in pus formation; if not limited by adhesions, general peritonitis may arise.

Any or all the above local lesions may be present, and in addition to these, owing to the poison being taken up by the lymphatics and veins, certain general lesions may occur.

B. General Lesions.

(*a*) **The Septic Matter may be Arrested at the nearest Lymphatic Glands,** and simply cause inflammation of the glands without spreading further.

(*b*) **Septicæmia** may occur. The poison, after passing the lymphatics, eventually reaches the veins, and the disease becomes general. If the poison is very virulent, death may occur before any secondary local inflammatory processes have had time to develop; so that after death no signs are found except the dark fluid state of the blood, and ecchymoses on the surface of various viscera. In less severe cases one or more of the following signs may be found after death: Congestion and inflammation (serous or purulent) of the pleuræ, pericardium, peritoneum and joints; congestion, ecchymoses and ulcerative inflammation of the mucous membrane of the intestine and of other organs.

(*c*) **Pyæmia,** with the formation of abscesses in various organs (lungs, liver, kidneys, etc.). The abscesses are dependent on the presence of septic matter in the different parts, or are due to the lodgment of infected emboli which have been detached from the clots in the uterine veins.

Symptoms and Course.—The symptoms generally commence within five days of labour, and vary with the intensity of the poison and the organ implicated. A chill or rigor usually ushers in the disease, the pulse increasing to 120 or more, and the temperature rising to 102°—104°. In the worst cases of septicæmia the course is very rapid; the pulse 120—140, and very weak; the temperature 103°—104°; the respirations are quick, and the breath has often a peculiar sweet odour; the tongue is a first furred, afterwards covered with sordes; there may be a little tenderness over the uterus, otherwise there is often no pain; the abdomen is distended and tympanitic; diarrhœa and vomiting are frequent; the milk is usually arrested and the lochia become fœtid. Some complication may occur, such as peritonitis (which is known by the onset of abdominal pain, tympanites, thoracic respiration, vomiting, etc.), pleurisy, pneumonia, pericarditis, nephritis (which are recognised by their usual symptoms and signs). Rigors and exacerbations of temperature are common, owing to fresh absorption of septic matter. The patient either dies from one of these complications, or she may pass into a typhoid condition, with low muttering delirium, rapid thready pulse, brown dry tongue, and die within a week or ten days without any local complication.

In the pyæmic form of the disease the course is more chronic, and secondary inflammations occur, which result in suppuration in different parts, *e.g.*, joints, muscles, serous cavities, and the various viscera. Rigors and exacerbations of temperature usher in the inflammatory processes. Jaundice is very common.

Treatment.—Prophylactic.—Whilst attending a case of puerperal fever, or infectious disease, the practitioner should, if possible, not take charge of any case of labour; if, however, this is impossible, the clothes should be changed and the hands washed in some antiseptic solution before attending the labour case. The nurse in attendance should be scrupulously clean. All instruments, sponges, etc., should be cleansed and disinfected before use. In a lying-in hospital patients with puerperal fever should be immediately isolated.

When the disease is present, the first thing to be done is to *prevent further absorption of septic matter* by washing out decomposing clots, sloughs, and pieces of placenta, etc., from the uterus and vagina; for this purpose injections of solutions of Condy's fluid, or carbolic acid, should be used twice daily. *The patient ought to be enabled to outlive the action of the poison.* To fulfil this indication, her strength must be supported by giving her, at frequent intervals, easily assimilated nutritious food, such as beef essence, milk, eggs, etc. Stimulants are often necessary, especially if the patient passes into a low typhoid condition. *The high temperature* is of itself injurious, and measures should be taken to reduce it; for this purpose Sulphate of Quinine gr. x may be given night and morning, or Salicylate of Soda gr. xv every six hours, or Tincture of Aconite in one minim doses every half hour for two or three hours, afterwards in three minim doses every four or six hours; if, however, the pulse is weak, Aconite should not be used. Cold may be applied to the skin for the same purpose—*e.g.*, sponging with cold water, application of the ice-cap to the head, and if the temperature is very high, baths may be used at a temperature of 70° to 80°. Various drugs, such as the sulphites and carbolates, have been used with the view of neutralizing the poison in the system, but their action is doubtful. **Treatment of Complications.**—*If peritonitis occur*, the pain is best relieved by the application of turpentine stupes, or leeches, and by giving opium internally; *for the tympanitis*, turpentine stupes applied to the abdomen, and enemata, containing turpentine, often give relief. If *pus formation* takes place and is accessible, it should either be aspirated, or opened by the knife and treated antiseptically.

LIV.—PELVIC CELLULITIS AND PELVIC PERITONITIS.

Definition.—Inflammation of the cellular and peritoneal tissue of the pelvis.

Causation and Pathology.—These diseases generally arise after labour, and are usually secondary to injury or inflammation of the uterus. The two diseases are often associated, and may or may not be accompanied by general septicæmia. In cellulitis the inflammation attacks the connective tissue surrounding the uterus and vagina, and that lying in the broad ligaments and iliac fossæ, leading to exudation and swelling in any of these parts. In peritonitis any part of the peritoneum of the pelvis may be attacked, but especially that lining Douglas's pouch and the broad ligaments.

Symptoms.—The onset is generally ushered in by a chill or rigor; pain is felt in the lower abdomen; micturition and defæcation are usually painful; vomiting frequently occurs. The pulse is increased in frequency, and the temperature raised to 102°—104°. *On examination per vaginam*, the vagina is found hot and swollen; tender induration and swelling exist on one side of, or behind the uterus; the uterus is more or less fixed and displaced by the exudation.

Termination.—The inflammation may end in *resolution* or *suppuration.* If **resolution** takes place, the febrile symptoms disappear, and the swelling contracts and becomes less tender, and is generally absorbed; this process may take weeks or months, and in some cases permanent adhesions with fixation and displacement of the uterus result. If **suppuration** occur, the fever continues, and is accompanied with rigors and exacerbations of temperature. A pelvic abscess eventually forms. It may point and open through the abdominal wall, or into the bladder, vagina, or rectum; occasionally it opens into the peritoneum, and general peritonitis results. Suppuration is more common in cellulitis.

Prognosis.—Recovery is the rule, but death occasionally results from exhausting suppuration or general peritonitis.

Treatment.—Absolute rest in bed should be enjoined. To lessen the pain, poultices should be applied to the hypogastrium, and Opium given internally, or Morphia subcutaneously. If the temperature runs high, Quinine is useful. Constipation, if present, should be relieved by castor oil, or enemata. *To favour absorption.*—After the acute symptoms have subsided, the patient should keep to her bed, and blisters may be applied locally. When *pelvic abscess* results and points in any direction it should be emptied by the aspirator, or opened by the knife and dressed antiseptically. Whilst suppuration is going on, plenty of nutritious food should be given, and stimulants if necessary; tonics and cod-liver oil are often of service.

LV.—PHLEGMASIA ALBA DOLENS—WHITE LEG.

Definition.—Swelling of one × or both legs, occurring within a fortnight after labour, and characterized by pain, tension, and whiteness of the skin, and depending chiefly on thrombosis of the main veins.

Etiology and Pathology.—1. **Thrombosis of the main vein** of the limb is the chief element in its production, the coagula-

× usually the left

tion depending on the *increased amount of fibrin in the blood* during pregnancy. The thrombosis may involve the femoral vein primarily, or it may commence in the uterine veins and afterwards spread to the iliac and femoral. 2. In rarer cases **the thrombosis is secondary to inflammation of the vein** and the parts around. In addition to the blocking of the veins, the lymphatics of the limb are probably obstructed.

Symptoms.—Acute pain near or along the vein accompanied by febrile symptoms (Pulse 120°, Temperature 101°, thirst, anorexia, etc.) precedes the swelling. The swelling generally begins in the groin, and by spreading downward may involve the thigh or the entire limb; occasionally it commences in the calf and extends upwards. The left leg is most often affected, and it may be followed by swelling of the opposite limb. The limb is swollen, white, and painful, and at first so tense that it will not pit on pressure. The vein may be felt as a hard tender cord. The fever and pain pass away in about a week or a fortnight, and absorption and disappearance of the swelling commence; months, however, may elapse before the swelling has entirely disappeared, and the limb regained its former strength.

Termination:

(*a*) Gradual absorption of the thrombus and restoration of the circulation generally occur.

(*b*) Organisation of the thrombus, and obliteration of the vessel sometimes results.

(*c*) Occasionally localised suppuration takes place; or diffuse suppuration with extensive sloughing of the skin, and death from exhaustion or septicæmia may occur.

(*d*) The thrombus may break up and infected emboli become detached and produce pyæmia; or an embolus may become detached and lodge in the pulmonary artery and cause death.

Treatment.—*To Relieve the Pain.*—The patient should rest in bed; the bed clothes should be kept off the limb by means of a cradle; poultices or opium fomentations should be applied; and if the pain keeps the patient awake a hypodermic injection of morphia may be given. Bleeding and other active measures are to be avoided.

To Favour Absorption.—After the pain has subsided the limb should be evenly bandaged from below upwards, and raised slightly; it may also be bathed gently with warm water daily, but rubbing the limb must be avoided for fear of detaching emboli.

Whilst there is any pain and fever the diet should be fluid and light; afterwards, when absorption begins, the diet should be more nutritious, and tonics may be given.

LVI.—OBSTRUCTION OF THE PULMONARY ARTERY PRODUCED BY THROMBOSIS OR EMBOLISM.

Definition.—Partial or complete blocking of the pulmonary artery, produced either by spontaneous coagulation (thrombosis) or by the impaction of an embolus brought from some part of the systemic venous system.

Etiology and Pathology.—In the case of thrombosis the coagulation depends probably on the excess of fibrin in the blood. In embolism the clot is detached from some vein, *e.g.*, the femoral, and is carried to the right side of the heart, and is sent thence to the pulmonary artery and there lodged.

The clots in thrombosis are white, firm and laminated. At first the blood can pass between the clot and the vessel wall; afterwards they may become adherent to the wall and organized. The coagulation generally commences in the small arteries and spreads backwards to the heart. In embolism after death a well-defined embolus, consisting of old fibrin, may be found, contrasting with the more recently formed fibrin around it.

Symptoms.—The onset is generally sudden, and is attended with intense dyspnœa; the throat and respiratory muscles act convulsively; the face is pale or livid; the heart beats tumultuously at first, afterwards its action becomes weak and irregular; the pulse is irregular and almost imperceptible. A harsh systolic murmur can be heard over the pulmonary artery.

Termination.—Death generally occurs from asphyxia or syncope, either immediately or after repeated attacks of dyspnœa. Recovery is possible if the obstruction is incomplete.

Treatment.—Absolute rest in bed must be enjoined, and no movement whatever allowed. Stimulants (brandy, ether, ammonia) should be given during the paroxysm. Alkalies and ammonia have been recommended with a view to prevent coagulation, and to favour absorption of the clot when formed.

LVII.—PUERPERAL ECLAMPSIA.

Definition.—Epileptiform convulsions connected with the processes of pregnancy, labour, and puerperal state. These convulsions ought to be distinguished from attacks of ordinary epilepsy and hysteria occurring in a pregnant woman.

Causation and Pathology.—(*a*) As a rule it is associated with renal disease and albuminuria, and many cases are dependent on the presence of an excess of urea in the blood, and hence are simply cases of **Uræmic Poisoning.** (*b*) According to Frerichs, the circulation of **carbonate of ammonia** in the blood (which is derived from the decomposition of urea) is the essential cause. (*c*) Some cases may be due to **cerebral anæmia**, which arises (according to Traube) thus: serous exudation, depending on the hydræmic state of the blood and increased blood pressure which normally exist during pregnancy, takes place through the blood vessels of the brain; the small vessels are then pressed upon by the exudation and anæmia results.

On Autopsy.—Œdema and anæmia of the brain are found, together with the signs of hyperæmia and inflammation of the kidneys.

Symptoms.—**Premonitory Symptoms.**—One or more of the following symptoms may precede the attack: Headache, vertigo, stupor, vomiting, blindness, etc. General œdema and albuminuria are usually present before the onset of the convulsions. **The Attacks** are usually sudden in their onset, and are very like an epileptic fit, consisting of two stages. (*a*) *That of tonic spasm.* (*b*) *That of clonic spasm.* The convulsions commence in the facial muscles, and the face becomes much distorted; they then gradually spread and involve all the muscles of the body, and the body may be fixed in a state of opisthotonos or pleurosthotonos, etc. The face is at first pale, but afterwards, owing to the tonic spasm of the respiratory muscles and arrest of respiration, it becomes livid; for the same reason the veins of the neck become distended. The pupils are dilated and insensible to light. The tonic spasms now give place to clonic spasms of the limbs, facial muscles and respiratory muscles, and the tongue is often bitten, owing to the spasms involving the tongue and jaw. Respiration commences, being jerky and noisy at first, and bloody froth runs from the mouth. The skin becomes bathed with sweat, and the urine and fæces are often passed involuntarily. One attack lasts from half a minute to a minute. During the attack the patient is unconscious, and remains more or less stupid for some time after; if the fits recur frequently she may be perfectly unconscious between the attacks. If the convulsions occur during pregnancy they generally bring on labour; if during labour, they may cause precipitate labour by the uterus partaking of their action.

Termination.—*Recovery* may take place after the birth of the child, or the patient may die from *asphyxia* or *exhaustion*, hence the prognosis is unfavourable as regards the mother; for the child it is also bad, as it may die *asphyxiated* from the venous condition of the placental blood.

Treatment.—Prophylactic.—Cases of albuminuria and œdema occurring during pregnancy should be treated as in the non-pregnant, by iron and milk diet; the œdema should be reduced by baths, diaphoretics, laxatives, etc. **During the Attack** *a purge should be first given, e.g.*, 3 grains of calomel, or, if the patient is comatose, a drop of croton oil may be placed on the tongue; by this means the vascular tension is lowered, and the blood cleared of some of its urea. *Venæsection* should be, as a rule, avoided; it may, however, be of service in the case of a strong healthy woman with a full bounding pulse. *To diminish the violence of the paroxysm*, chloral hydrate and potassium bromide ā.ā. gr. xx. should be given every six hours by the mouth or rectum, or morphia may be given hypodermically. During the attacks chloroform should be administered. To prevent the tongue from being bitten, a thick piece of cloth should be placed between the teeth.

If the fits come on during pregnancy, labour should not be artificially induced, but should be allowed to come on of itself, as any irritation of the uterus by tents and other instruments necessary for the induction may bring on another attack of convulsions. When the fits come on during labour, the labour generally terminates quickly; if necessary, however, it may be assisted by the forceps.

LVIII.—PUERPERAL INSANITY.

This term includes (*a*) *Insanity coming on during pregnancy;* (*b*) *Insanity coming on after labour, i.e.*, during the puerperal state (puerperal insanity proper), and during the period of lactation (insanity of lactation).

1. **Insanity of Pregnancy** is the least common of the three forms.

Causation.—It generally depends on some hereditary predisposition to insanity or nerve disease; or it may be brought on by fright, or by great dread of pregnancy and labour. It is most common in old primiparæ.

The Symptoms are usually of melancholic type, with great mental depression. There is a great tendency to suicide. The disorder appears about the third month, and persists generally till after labour, when, as a rule, recovery takes place.

2. **Insanity coming on after Labour** (puerperal insanity and insanity of lactation) is the most common variety. **Causation.**—It is induced by the same causes as that occurring during pregnancy, and it is also predisposed to by conditions producing great exhaustion, such as hæmorrhage, albuminuria, prolonged lactation.

Symptoms.—When occurring during the first fortnight after delivery they are more often those of acute mania; after that time and during the period of lactation melancholia is more common.

The maniacal variety is characterised by great restlessness, incoherent rambling, religious delusions, and outbreaks of excitement, in which she may do herself or the child harm. The patient often refuses food; the bowels are constipated, and the fæces and urine may be voided involuntarily. The lochia and milk are generally arrested. This variety is usually of short duration.

In the melancholic variety, sleeplessness, great depression, delusions, generally of a religious character, and a tendency to suicide, are the leading symptoms. This variety is apt to pass into chronic dementia.

Occasionally during labour a temporary outbreak of mania develops, in which the patient may injure herself or the child; the attack passes off after birth of the child.

Treatment.—The patient should be kept in a darkened and quiet room. Sympathising friends should be excluded, and an experienced nurse always left in charge. The patient should be persuaded to take plenty of nutritious food, but, if she persistently refuses, a large soft catheter should be passed through the nose down into the æsophagus, and fluid nourishment administered through this. Stimulants are to be given if there is much exhaustion. For the sleeplessness, Chloral with Bromide of Potassium ā.ā. gr. xx. may be given by the mouth or rectum. In cases of mania, a warm bath or the wet pack is sometimes serviceable in quelling excitement and procuring sleep. The bowels should be regulated by an occasional aperient. Gentle exercise, country air, and avoidance of excitement are useful during convalescence.

Some cases, especially those of melancholia, are best treated in an asylum.

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